Ground Robots for Autonomous Operations in Oil & Gas

Improve Efficiency By Using Robots To Inspect Remote Worksites And Assets
The oil & gas sector is going through a turbulent time. While the industry has largely bounced back from the sharp decline caused by COVID-19, there is now pressure to meet rising consumer demands while reducing costs and implementing emission reduction strategies. There’s a desperate need for greater efficiency at all stages of the value chain.

There are long-standing challenges as well. The sector remains one of the most dangerous occupations. According to the Occupational Safety and Health Administration (OSHA), 489 oil & gas workers were killed on the job between 2013-2017. Oil & gas workers are often exposed to flammable gases and vapors. And roughly 4 of every 10 fatalities in oil & gas result from a highway vehicle incident, as workers drive long distances to inspect sites.

The oil & gas sector is also facing a skills shortage. Exploration, production, and oilfield services providers were forced to let go roughly 100,000 workers in 2020, and only around a third of those jobs are back. The industry needs to attract new talent by creating safe and exciting career pathways for the next generation.

There are also maintenance challenges on an operational level, including the need for regular inspections of assets in remote locations. This problem is compounded by inefficient data management, as many companies still rely on multiple analog data sources across many locations. This slows down decision-making and the detection of issues.

Faced with these difficulties, oil & gas leaders are turning their attention to how digital transformation can overcome their challenges, and ground robotics is a big focus for 2022. Ground robots promise to be a game-changing technology in the sector – improving safety for workers and enabling the real-time surveillance of critical assets.

In this eBook, you’ll learn:

- Why ground robots are having a significant impact on upstream, midstream, and downstream operations
- The benefits are of using ground robots to inspect assets and equipment
- How DroneDeploy helps you automate data capture with ground robots
Why Ground Robots are Transforming Operations in Oil & Gas

Today’s ground robots come in many forms, including quadrupeds, rovers, and wheeled vehicles. Many of them are hardy and rugged enough to withstand hazardous environments and high temperatures. Some companies are even building explosion-proof robots specifically designed to work in areas with flammable gases.

Like Spot from Boston Dynamics, many ground robots are strong enough to carry a range of sensors. You could attach a high-definition camera, a thermal camera, and a sensor for detecting methane emissions on a single robot. This means you can build one payload for the robot suitable for performing multiple inspection tasks simultaneously.

These unique capabilities make ground robots useful for all three stages in oil & gas.
1. **Upstream**

Upstream equipment requires regular inspections to ensure compliance with legal regulations and efficient extraction. Ground robots can autonomously inspect assets in drilling, completions, and well pad operations. They’re also useful for inspecting remote sites and offshore oil platforms, reducing the need for employees to travel, and ultimately driving down the cost of operations while improving safety.

2. **Midstream**

Ground robots reduce risk and decrease costs for pipeline, tank, and storage terminal inspections. They can visually inspect these assets for rust, corrosion, cracks, or fluid leaks or detect and locate leaks using gas sensors. Autonomous guided vehicles (AGVs) help with aspects of loading and transporting products. And robots with methane sensors provide operators with continuous emissions monitoring.

3. **Downstream**

Ground robots help to ensure site compliance for refineries and equipment while increasing inspection efficiency and profitability. They can capture 360-degree data to build visual twins of refineries – so that managers can monitor operations, assign workers to fix issues, plan maintenance strategically, and minimize equipment downtime.
The Benefits of Ground Robots for Autonomous Operations

Identify problems and abnormalities earlier

Use ground robots to perform regular autonomous checks of your equipment on remote sites. Document valve positions, gauges, and sensor readings to prevent false positives or negatives. Augment your team with a robot’s ability to better detect gases and collect accurate thermal and infrared readings. With these consistent data-driven insights, identify issues or abnormalities early, predict failures, and respond proactively.

Reduce maintenance costs and downtime

Finding and solving issues on sites can be time-consuming and costly for workers. Instead, send ground robots in first to perform an initial diagnosis of the issue, equipment, and environment. You can then ensure operators arrive at the site prepared with the exact tools and expertise they need, reducing non-productive time (NPT) and equipment downtime.

Augment your team with a robot’s ability to better detect gases and collect accurate thermal and infrared readings
Improve workplace safety and minimize travel

Send ground robots into hazardous environments to investigate and document ad-hoc issues while employees safely teleoperate the robot from anywhere. You can also leave robots on remote sites or in hard-to-reach areas to perform regular rounds or inspections. This minimizes the amount of long distance travel for workers, reducing the risk of road accidents.

Reduce your environmental footprint

Oil & gas companies are under increasing pressure to meet GHG and ESG targets. Instead of walking around sites to take measurements, automate GHG monitoring by sending ground robots with gas sensors and OGI cameras to capture data. Or leave robots on remote sites to quickly identify and locate leaks. This has the added environmental benefit of reducing the amount of driving needed to inspect sites.

Streamline the construction of new sites

When constructing new sites, use ground robots to track progress on projects. Schedule robots to perform autonomous daily inspections with 360 cameras and use this data to create virtual walkthroughs of the environment. Compare as-built with design plans, detect construction issues early, reduce rework, and share progress with stakeholders.
DroneDeploy Ground Robotics Features

DroneDeploy is designed to optimize data capture from robots, allowing you to automate robot missions and intervene as needed, even in situations where connectivity is limited. We’re working with leading oil & gas companies to find innovative robotic solutions to their operational and maintenance challenges.

Autonomous inspections

With DroneDeploy, you can leave robots on remote sites and use our mission planning feature to schedule regular and autonomous inspections. Save time and costs by not requiring a human operator on-site, and ensure the consistency and frequency of data capture. Build and schedule regular walkthroughs within a 2D or 3D environment for greater context. Set up alerts to inform operators if maintenance or intervention is required.

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Inspection on-demand

If there’s an urgent ad-hoc issue that needs investigating, use DroneDeploy to reliably teleoperate a robot from anywhere in the world and verify the problem before sending a team out. Connect to the robot’s cameras or sensors in real-time and stream data via the DroneDeploy platform. Once the issue is confirmed, send engineers or operators to perform maintenance with the right tools and details. You can leave robots in several locations and operate them all from one platform.
All data in one platform

With DroneDeploy, ground robots upload data to our centralized platform, which includes all aerial imagery and any other DroneDeploy data already captured. This allows operators to see data from all sites and provides a single source of truth to share with stakeholders. Tag and annotate issues to share with workers, or generate comprehensive reports on asset compliance. Employees won’t have to sift through thousands of images or manually add geolocation data.

Get started

Whether upstream, midstream, or downstream, ground robots are a game-changing technology for oil & gas – saving significant time and costs, improving uptime, and keeping your workers safe. Contact us today to discuss how ground robots can work for your business.

DroneDeploy is the leading enterprise-grade site reality platform. Trusted by brands globally, our software converts job sites, structures, and assets into easy-to-understand digital representations, generating valuable insights for industries including construction, energy, and agriculture. Through mapping, 3D modeling, analysis, and reporting, we provide a detailed and accurate digital replica of any asset, enabling our customers to take action, save time, and lower unforeseen costs.