

Monitoring & Maintaining Oil & Gas Pipeline with Drones

Highlights

- Accurate records of asset condition.
- Digitization of pipeline inspections.
- Periodic surveillance.
- Regular monitoring of pipeline spread across 300+ km.
- Detection of anomalies, encroachments & illegal activities with aerial intelligence.
- Hundreds of kilometres of pipeline secured with drone-based monitoring.



Client

A Fortune 500 company in the oil & gas sector

Need for Innovation in Pipeline Monitoring

Underground pipelines have proven to be one of the easiest and safest ways to transport hydrocarbons. But the probability of the loss of integrity and risk of damage to the pipeline exists due to interference from third parties, corrosion, accidents, human error, etc., during normal operation cannot be overlooked. Therefore, the timely surveillance of pipelines becomes important to monitor the above-mentioned issues. Due to the geographic placement of these pipelines that run hundreds of miles, enterprises in the oil & gas industry face logistical challenges, as staff cannot perform temporal monitoring by foot or vehicular modes. In such a situation, pipeline surveillance using drone plays a vital role in the timely monitoring of pipelines spread over a longer stretch.

Pipeline Monitoring Needs	Challenges in Manual Data Collection
Regular patrolling to maintain pipeline integrity.	On-foot or vehicular patrolling is time-consuming, expensive, and exposed to errors.
Inspecting pipeline passing through hard-to-reach areas to identify and report damage.	Monitoring pipeline in hard-to-reach areas is very difficult and poses a threat to the safety of workers.
Inspecting pipeline in extreme temperatures.	Manual inspection in extreme temperatures is not feasible and likely to compromise worker safety and affect the outcomes.
Identifying constructional and structural aspects of control stations.	Regular manual inspection takes time. Delayed inspection could put control station's construction and assets at risk.
Checking for damage to pipeline markers, test stations, above ground installations, and more.	Allocating workers to perform this job is cumbersome, cost-intensive, and inaccurate.
Identifying anomalies along the pipeline network.	Manually identifying anomalies around such a long pipeline network can take weeks.

Asteria Aerospace's Role

Asteria Aerospace is a leader in drone technology in India and offers drone-based solutions specifically designed to help enterprises in the oil & gas sector meet their diverse needs and overcome challenges.

Asteria partnered with one of the largest Fortune 500 companies in oil & gas sector to monitor their cross-country pipeline in central India that covers a total distance of 300+ km to transport natural gas. The vast network of pipeline required periodic monitoring for maintenance and hazard inspection, to avoid pipeline damage, equipment failure, and

potential accidents. As opposed to other inspection methods, drone systems offer flexibility and stability. A drone-based orthomosaic survey of the entire length of the pipeline was conducted in November 2022 & video surveys of the whole pipeline were conducted on a quarterly basis.

The total pipeline length is 300+ km with pumping, pigging, metering and regulating stations. The objective of drone based video/orthomosaic surveys on a monthly basis is to detect encroachments, illegal activities, etc., that take place in the pipeline corridor. Pipeline monitoring through

drones helped the oil & gas company to have access to periodic data for planning their response better.

Asteria's drones operated in areas with the harshest geographical features, including hilly terrains in central India. These drones have the ability to adapt to the type of terrain they are flying in and detect and avoid contact and return safely to the base on the completion of the mission. They are capable of monitoring such a vast pipeline network because of their high endurance and long range.

Technology at Work

Asteria's new-age, reliable, and performance-driven drones with high endurance and range were used in conjunction with its cloud-based drone operations and analytics platform – SkyDeck – to monitor the pipeline on a monthly basis. This helped in maintaining pipeline's integrity, and identifying encroachments, damages & anomalies over RoU, if any.



Outcomes

- Captured high-resolution data (5 cm GSD or better) of 300+ km pipeline on a monthly basis.
- Provided orthorectified imagery of the pipeline in soft graphics as well as printable format.
- Marked the exact location of features, such as a building, fence, or any other object present along the length of the pipeline.
- Analysis of orthorectified imagery resulted in the

Detection of 96 encroachments at various sections of the pipeline.	Identification of 182 cases of formation of water bodies and 4 cases of debris formation over ROU.	Detection of 120 instances of illegal soil digging at different locations along the pipeline.
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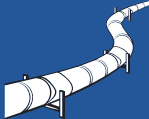



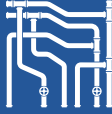
- Generated geo-referenced videos with time stamps to identify the exact location of anomalies as well the time they were captured.



The Impact

One of the largest companies in the oil & gas sector in India leveraged the drone expertise of Asteria Aerospace to survey the pipeline spread across 300+ km and generate detailed reports for analysis in 35-40 days. The company was able to acquire multiple data points to gain optimum situational awareness, enabling it to respond immediately to issues related to the condition of the pipeline network at any given time. Asteria was able to capture video and provide periodic intelligence on the pipeline RoU to the oil & gas company.

Benefits

 <p>As compared to helicopter survey, drone survey results in a 75-80% lesser cost.</p>	 <p>As compared to manual survey, drone survey eliminates the need to deploy humans in the pipeline corridor.</p>	 <p>Increases asset safety by increasing inspection frequency.</p>
 <p>Enables better record keeping of asset condition.</p>	 <p>Helps in tracking differences in old encroachments and formation of new ones.</p>	 <p>Facilitates the maintenance of the overall integrity of the pipeline network.</p>



Unmanned Aerial Systems & Solutions

ASTERIA AEROSPACE LIMITED
T : +91 73 5303 6888 **E :** info@asteria.co.in **W :** www.asteria.co.in
Bengaluru | Gurugram | Mumbai

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