



Drone Inspection Maintenance In Industry

OUR BIG IDEA

Majority of accidents in industries are reported due to damage or failure of static equipment rather than rotating equipment. Mechanical failure of static equipment in the industries can only be prevented through regular inspection and monitoring by qualified personnel as part of reliability centered maintenance (preventive plus condition based monitoring). EEPCON provide drone-based inspection, Non-destructive Examination (NDT / NDE) and data acquisition services for civil structures and static / fixed assets of Industries including Oil and Gas, Petrochemical, Energy, Mining, Construction and Agriculture etc. These drone-based field investigations provide invaluable information to the operational and maintenance managers.

Drones

An **unmanned aerial vehicle (UAV)**, commonly known as a **drone**, is an aircraft without any human pilot, crew, or passengers on board. UAVs are a component of an unmanned aircraft system (UAS), which includes adding a ground-based controller and a system of communications with the UAV. The flight of UAVs may operate under remote control by a human operator, as **remotely-piloted aircraft (RPA)**, or with various degrees of autonomy, such as autopilot assistance, up to fully autonomous aircraft that have no provision for human intervention.



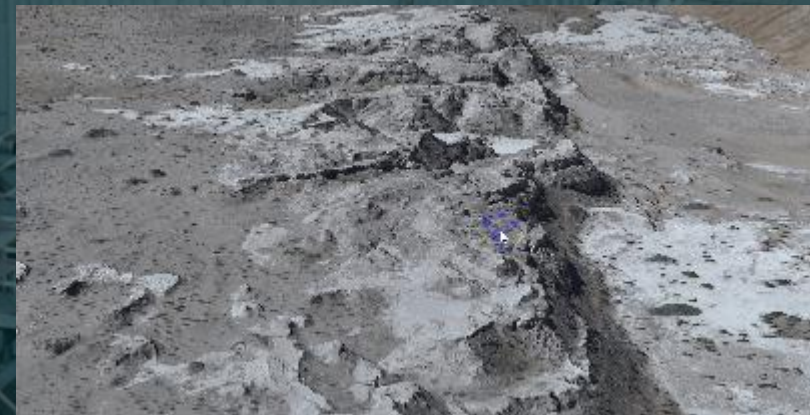
Inspection Using Drones



- ✓ A drone inspection is a process of using drones to look for potential maintenance issues. The drone acts as the inspector's eyes and will fly over and around the asset, allowing the inspector to take a closer look at all relevant areas that need maintenance.
- ✓ Drones can carry different sensors to perform different inspections. For example, thermal imaging drones can remotely measure temperatures, analyze heat issues, and detect gas and liquid leaks and heat discrepancies. Many other Payloads like Humidity Sensors, Ultrasonic Thickness Sensor etc can be used.
- ✓ The use of commercial drones to conduct inspections can significantly improve business operations across industries. These inspections increase precision, provide safer options for the workforce and drive efficiency.

Advantages of Drone Inspection

- Lower inspection costs
- Better imagery and data collection
- Save time
- Ability to reach hard-to-reach places
- Improved safety



Company's Maintenance Strategy

Maintenance of assets and equipment entails costs which should match the desired objectives and benefit. A prudent maintenance manager is required to exercise judgment in making maintenance plans and maintenance strategy through categorizing the asset into classes.

Least Priority Assets	Medium Priority Assets	High Priority Assets	High Priority Assets with added Regulatory Compliance Obligations
➤ Equipment having minimal importance to operations and having low cost come under Run-to-Failure maintenance strategy ➤ Repair, restoration or parts replacement	➤ Equipment that can be taken offline, inspected periodically and repaired when necessary as part of preventive maintenance strategy ➤ This strategy require annual review of schedule and sometimes support from predictive maintenance strategy to reduce the cost	➤ High value assets / equipment having critical performance function are often put under condition-based or Predictive maintenance strategy ➤ Additionally require sensors, monitoring devices, software and centralized servers to provide for continuous monitoring of the running equipment	➤ A sophisticated development of predictive and preventive maintenance strategy is reliability-centered-maintenance which is highly cost intensive and usually practiced by organizations under regulatory compliance obligations and those who want to go beyond the usual performance levels of the industry

Technical Support For Maintenance in Industry

API

- API publications cover upstream maintenance requirements for offshore structures and floating production systems, wellhead equipment & tubular goods, valves and drilling and production equipment.
- API publications in the midstream and downstream sector covers pipeline operations and refinery equipment, including storage tanks, pressure-relieving systems, compressors, turbines, and pumps, fire & safety protection and petroleum measurement

CSA

- Canadian Standard Association (CSA) is an accredited body for provision of standards
- CSA publications are also a good source of technical guideline for maintenance requirements

DRONE REGULATIONS

- In recognition of the significant potential for commercial use of drones in various sectors of economy, the Canadian government has incorporated / amended rules for certification and compliance requirements for UAVs as section 602.41 of Canadian Aviation Regulations SOR/96-433
- United States FAA has issued Part-107 of the Federal Aviation Regulations in August 2016 providing guidance for Operating Requirements, Pilot Certification, UAS Certification etc for Unmanned Aircraft Systems UAS
- UK Civil Aviation Authority has issued regulations related to Remotely Piloted Aircraft Systems (RPAS) issued guidance as CAP 722 – Unmanned Aircraft System Operations in UK Airspace for regulating RPAS operation in UK
- EASA Basic Regulation adopted in December 2016 by the European Council contains the first ever EU-wide rules for civil drones to fly safely in European airspace. This regulation contains general principles on revised common safety rules for civil aviation and a new mandate for the European Aviation Safety Agency (EASA)



DRONE SAFETY



No flight above
400ft
from the surface.



No flight within
150m
of a congested area.



No flight within
50m
of people, property, vehicles or
vessels not under your control.



No flight further than
500m
from the operator.



No person inside
30m
on take-off and landing except
the drone pilot or people
under the pilot's control.



No flight inside
1km
of the boundary of an
aerodrome without permission.



No drone weighing
7kg
or greater to fly in
controlled airspace
without permission.



Never fly unless you
are satisfied the
flight is safe to be made
and always check the weather
frequently throughout the day.



Always **check the controls**
for the drone are working
before every flight ...
even after a short break
to change its battery.



Only look at the screen on the operating
controls to frame a shot or check battery
power. **You should be looking at your
drone and scanning for incursions
by aircraft 99% of the time.**

SERVICES WE OFFER

- ✓ 3d Drone Mapping
- ✓ Structural Inspection (Ground Tanks, Pressure Vessels)
- ✓ Inspection of Boilers and Heat Recovery Steam Generators
- ✓ Thermal Imaging
- ✓ Building Inspection
- ✓ Powerline Inspection
- ✓ Damage Inspection
- ✓ Ultrasonic Thickness Measurement
- ✓ Building Structure Inspection
- ✓ Indoor Space Inspection
- ✓ Roof Condition Survey
- ✓ Roof Leak Detection
- ✓ Thermal Roof Scans
- ✓ Railway Inspection
- ✓ Wind Farms Surveys
- ✓ Visual Inspections
- ✓ Pipeline Inspections



Areas of Drone Inspection

Drone Inspection

Agriculture Drone Inspections

Chemical & Fertilizers Industry Drone Inspections

Construction Drone Inspections

Power Generation Drone Inspections

Mining Drone Inspections

Oil and Gas Drone Inspections

Wind Energy Drone Inspections

Solar Energy Drone Inspections

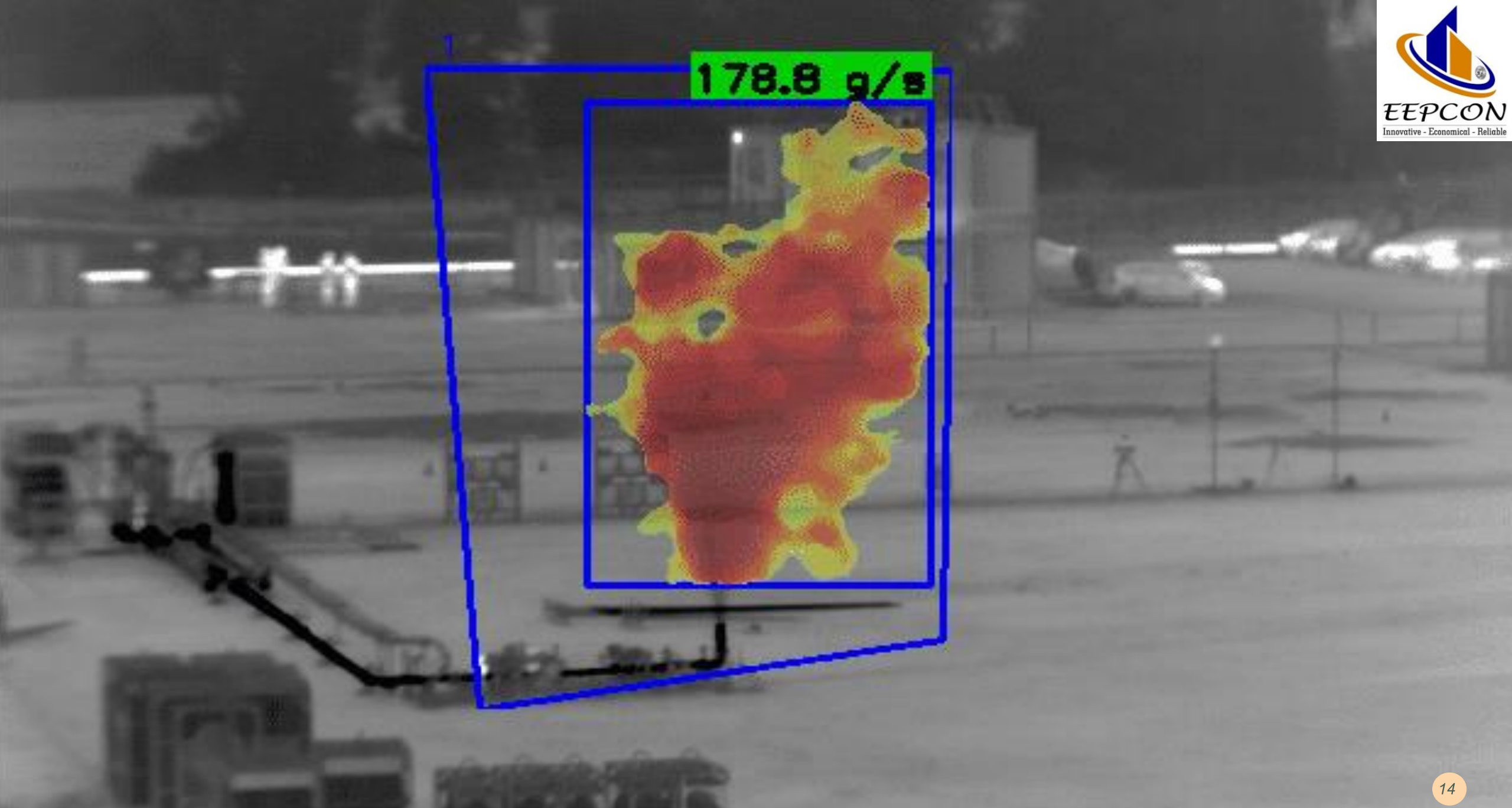
Hydro Energy Plant Drone Inspection

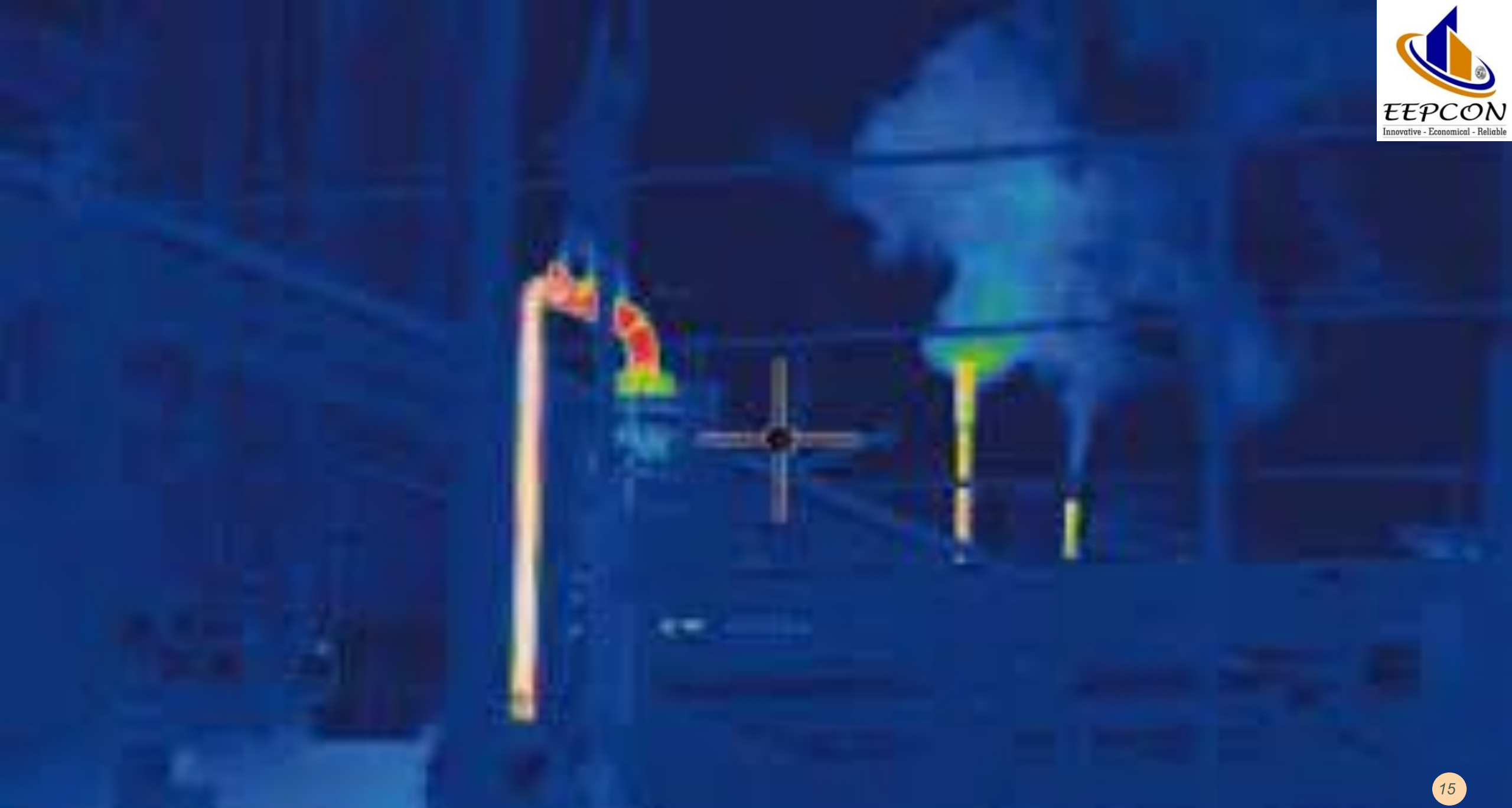
Drone Inspection For Chemical & Fertilizers Industry

Chemical & Fertilizer Industry Drone Inspections

We Identify and Inspect

- Gas Leaks
- Cracks
- Rust
- Corrosion
- Temperature Anomalies in Flare Stacks
- Condition of Distillation Towers
- Condition of Pipelines









3D laser measurement

Flight route creation

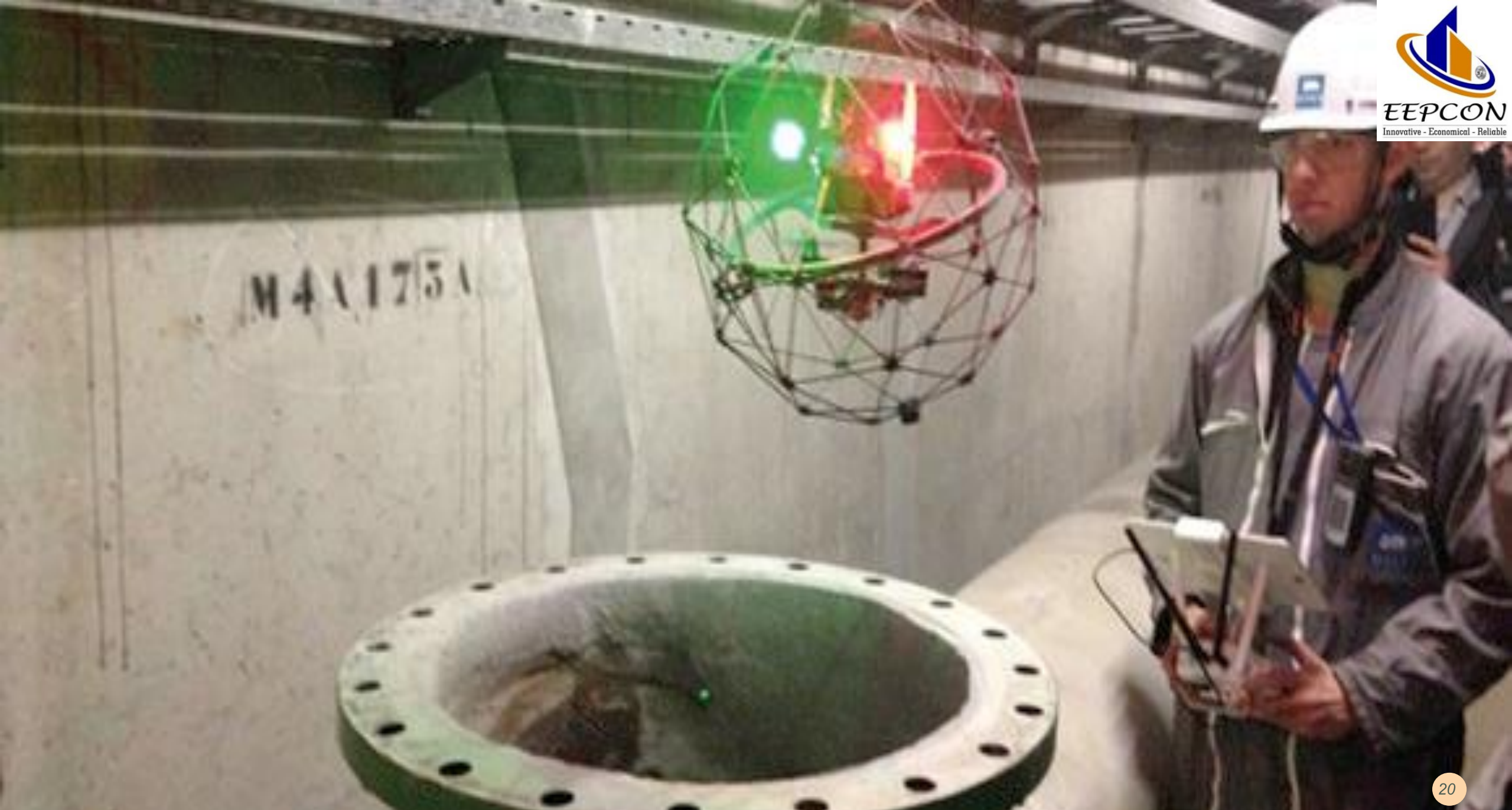
Drone takes video

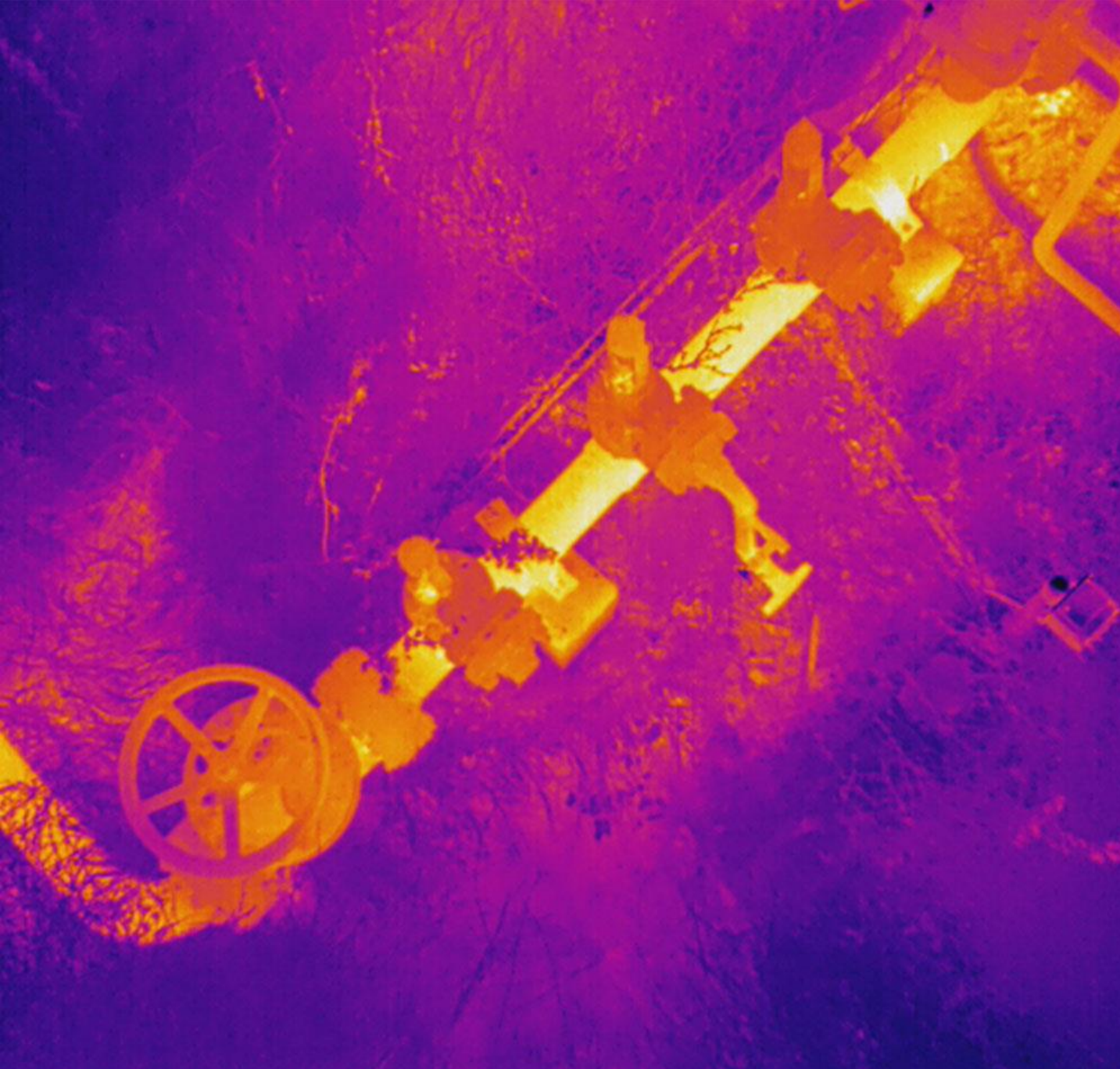
Display



Realizes 3D model visualization through flight route creation and video by drone

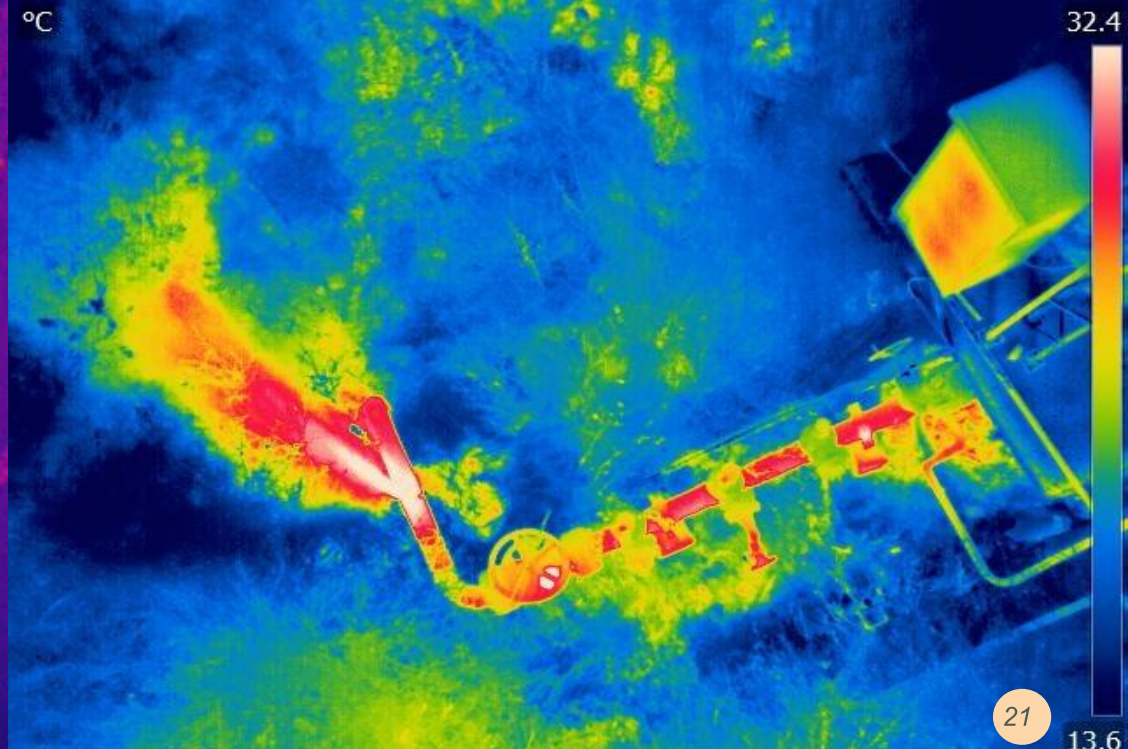
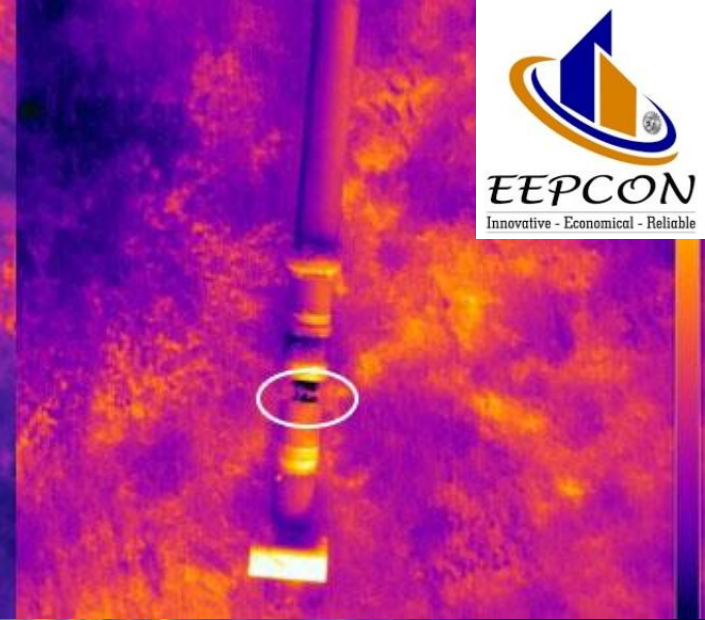






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Advantages of Chemical & Fertilizers Industry Drone Inspection

- Helps plant operators monitor critical infrastructure.
- Reduces Inspection Cost
- Increases Safety for Workers
- Drones can enter hazardous confined spaces such as tanks, cables, stirrers, reactors, or pressure vessels to inspect for leaks or cracks, identify signs of rust and corrosion, and locate dropped or unwanted items within the asset

THANK YOU!



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