

TNB REPAIR AND MAINTENANCE SDN. BHD ("TNB REMACO")

COMPANY INTRODUCTION

About TNB



TNB is the largest electricity utility in Malaysia and a leading utility company in Asia with an international presence in United Kingdom, Kuwait, Turkey, Saudi Arabia, Pakistan, India and Indonesia.

WHO WE SERVE

We have served our industrial, commercial and residential customers in Malaysia for over 70 years.

INDUSTRIAL

Our industrial customers engage in the manufacture of goods and services. Although they make up the smallest segment of our customers, they also account for the majority of our electricity sales.

COMMERCIAL

Our commercial customers are our second-largest source of electricity sales, carrying out the business and commercial activities which drive our economy.

RESIDENTIAL

Our residential customers represent the majority of Malaysia's estimated 32.7 million population. As our largest market, they drive us to deliver excellence in our products and services.

- Pen. Msia installed capacity: 26,525 MW
- TNB : 16,030 MW
- IPP : 10,522 MW

1 Generation

- Max. demand: 19,183 MW
- System availability: 99.76%
- Circuits Km: 27,548 km

2 Transmission

- Network length : 703,312 Km
- Substations : 85,127
- SAIDI : 11.97 mins
- CSI : 86%

3 Distribution

Awards & Recognition

TNB has also received awards and recognitions over the years for its sustainability reporting and performance. TNB's FY2021 recognitions include:



World Branding Award



Australasian Reporting Awards (ARA)



Annual Reports Competition (ARC) International Awards



National Annual Corporate Report Awards (NACRA)



TNB TRAINING INSTITUTE
DENGKIL | MALAYSIA



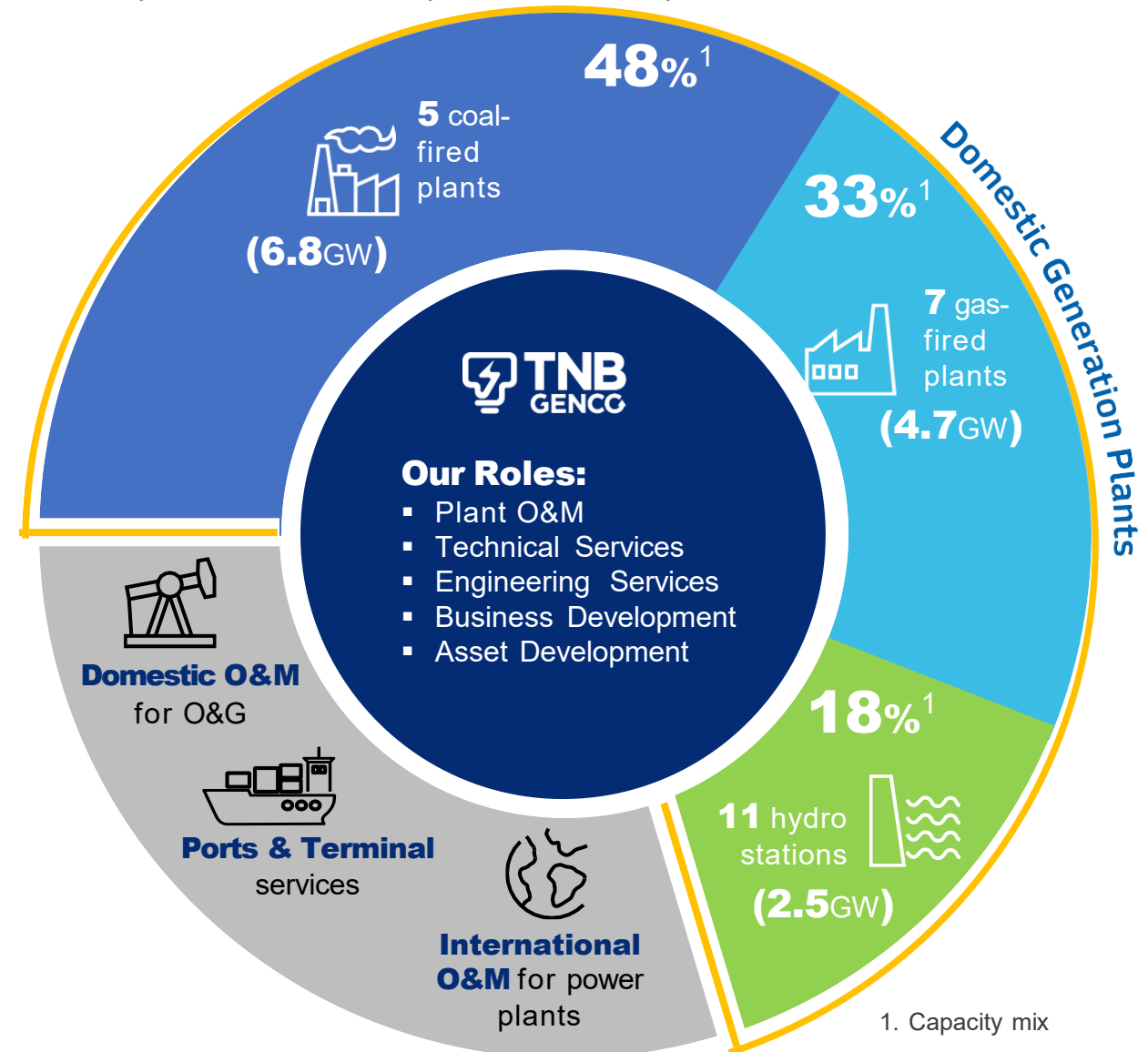
University Tenaga Nasional (UNITEN)

About TNB Power Generation Sdn Bhd (“TNB Genco”)

TNB Genco is a company with businesses involving power plant development, construction, operations & maintenance. We are fully integrated with end-to-end capabilities from plant development to end-of-life management

TNB Genco at a Glance:

- A **wholly-owned subsidiary** of TNB since **1st Oct 2020**
- Focusing on power generation business, home to all domestic **conventional** and **renewable generation** assets
- Owns **53% of domestic generation market share, totalling 14GW** contracted capacity
- Holds two (2) subsidiaries: TNB REMACO & TNB INTEGRAX - focused on **energy related services** and **port & terminal management services** respectively
- Continues to deliver **strong capacity growth** and **operational excellence** since the launch of Reimagining Tenaga (RT) strategy in 2015 and is well-positioned to achieve SP2050 net zero aspiration



About TNB REMACO

Helping energy-related asset owners **maximising their asset value and life** through our services and **to be preferred and trusted service provider** in the industry

TNB REMACO briefly :

- A **wholly-owned subsidiary** of TNB Genco
- Specialized in:-
 - **Operation & Maintenance (O&M)**
 - **Maintenance Services (MRO)**
 - **Repair Centre**
 - **Test and Diagnostic**
 - **Technical Services**
- Provide **holistic engineering services** solution encompassing operation, maintenance, repair, testing, diagnostic, refurbishment, reverse engineering, project management and part supply.



MAIN BUILDING

Dimension : 100 m x 122 m
Height : ± 34.5 m
No. of Storey: 11

Repair Centre Capabilities

- GT, ST, and Hydro Turbine Part Repair
- Transportable Lathe & LM2500 L2 Workshop
- Bearing Remetalling & Machining
- Refurbishment, RE Parts, Metallurgical Lab



Transportable Lathe Machine & Balancing

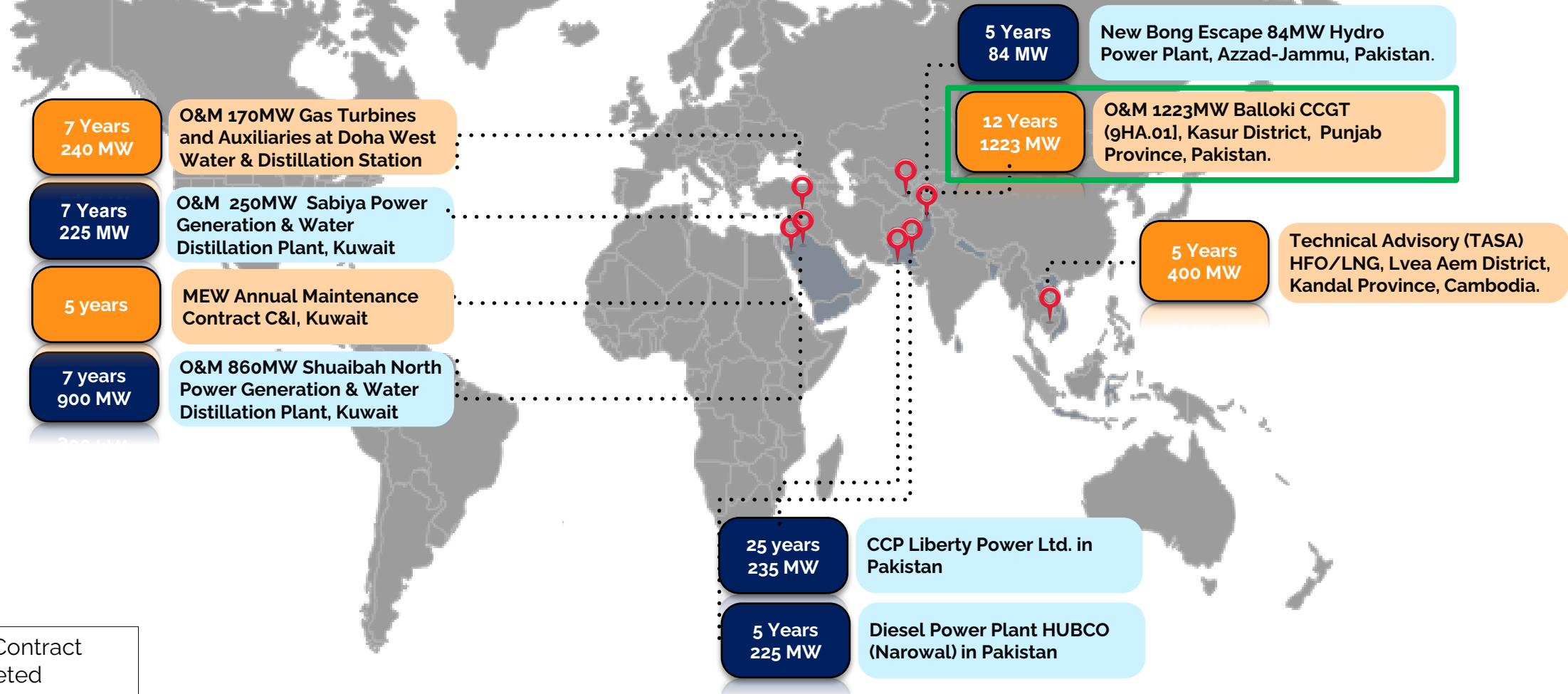
CEMB, Shenk 5T & 100T and KAWA 100T

In-house/ In-situ rotor machining & balancing Rotor journal welding & Heat Treatment

**Frame 5 rotor
stacking and
de-stacking**



TNB REMACO Portfolio - International (O&M Services)



Active Contract
Completed

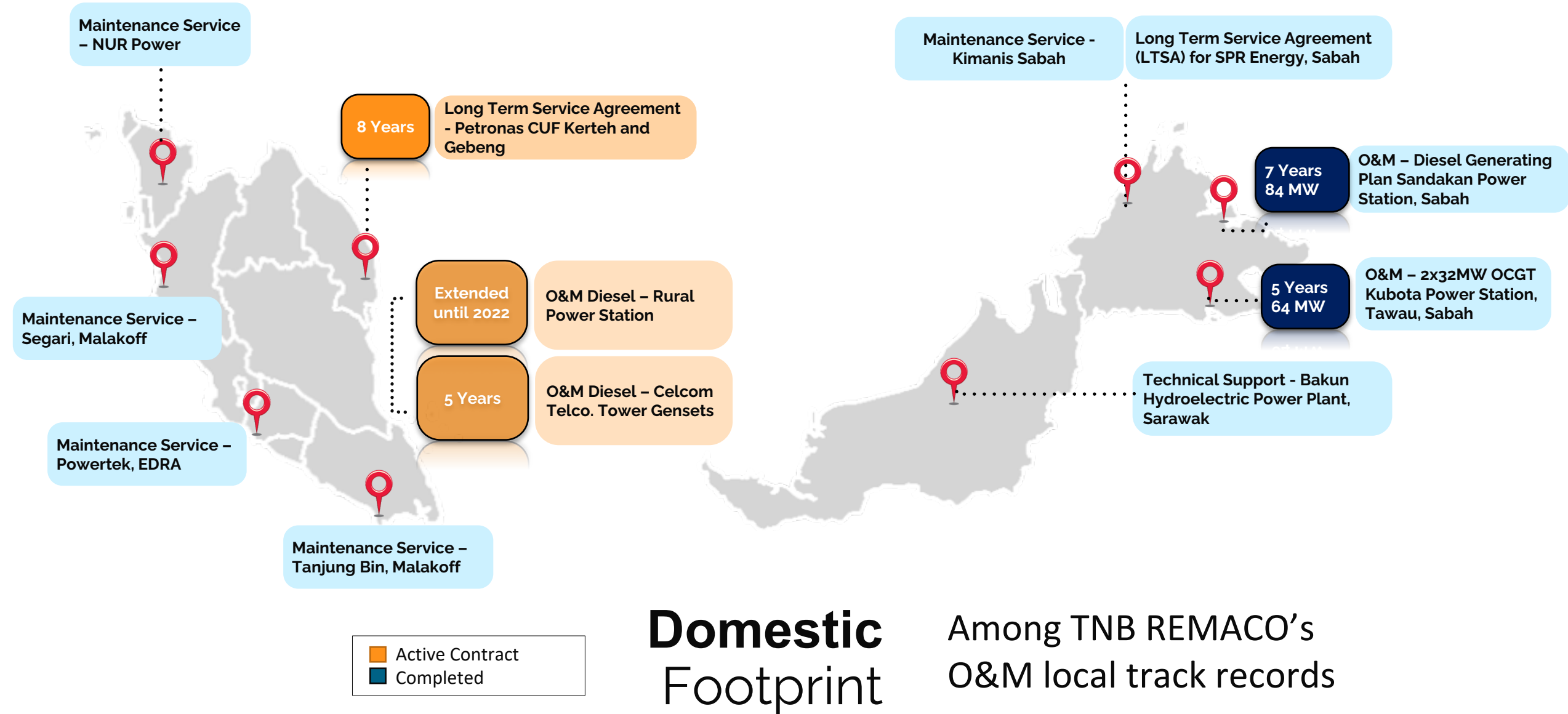
(~3,500MW consists of H-Class, F-Class, Aero, Diesel, Hydro, Conventional Power Plant)

International Footprint

Among TNB REMACO's O&M international track records

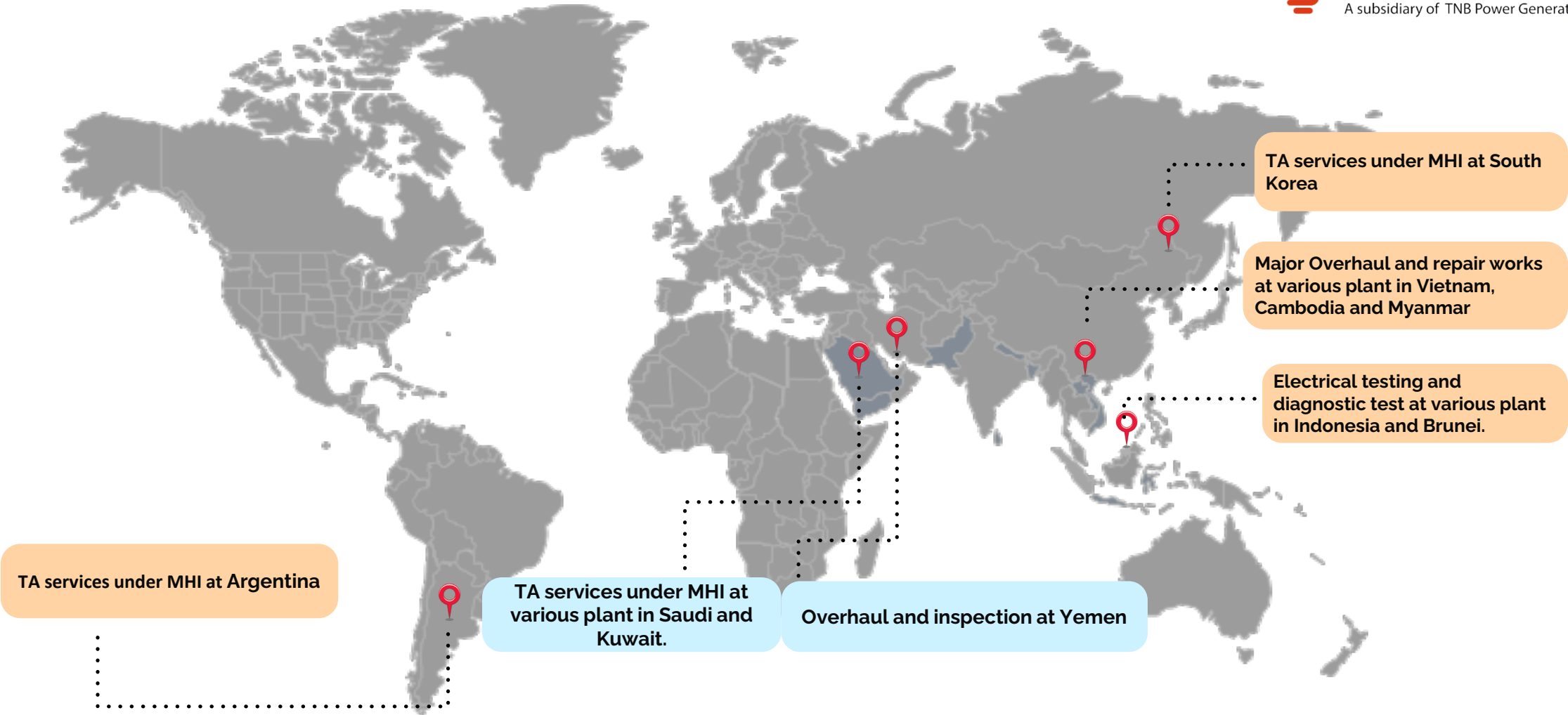


TNB REMACO Portfolio - O&M and MRO Domestic





TNB REMACO Portfolio - International (MRO Services)



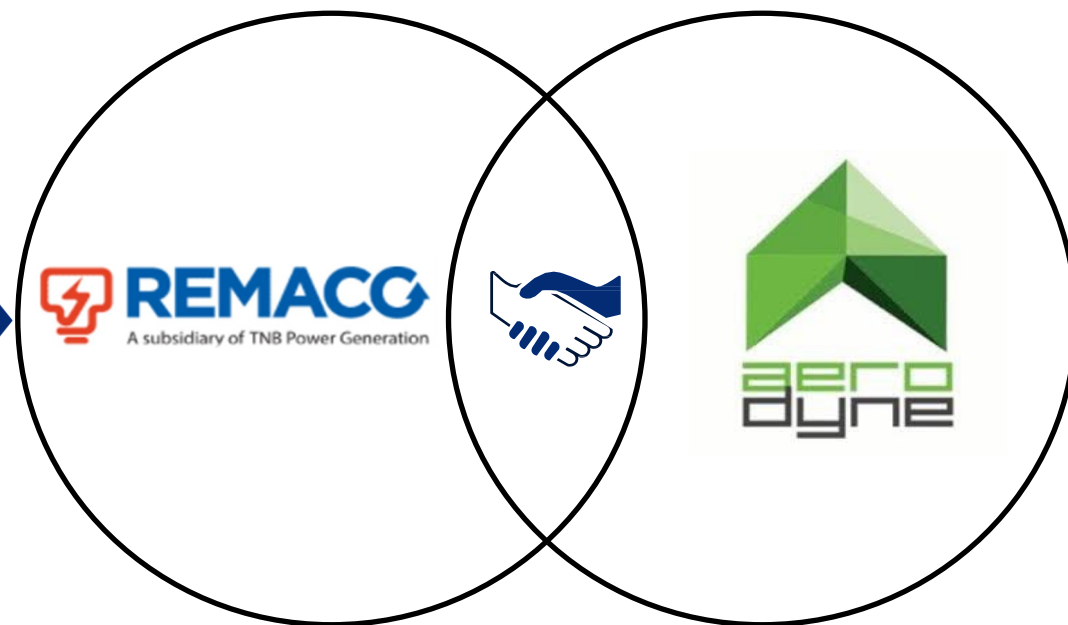
International Footprint Among TNB REMACO's MRO international track records



Business Collaboration between TNB REMACO and Aerodyne

Collaboration Purpose:

To pursue International business opportunity by utilizing both parties' experiences, capabilities and expertise.





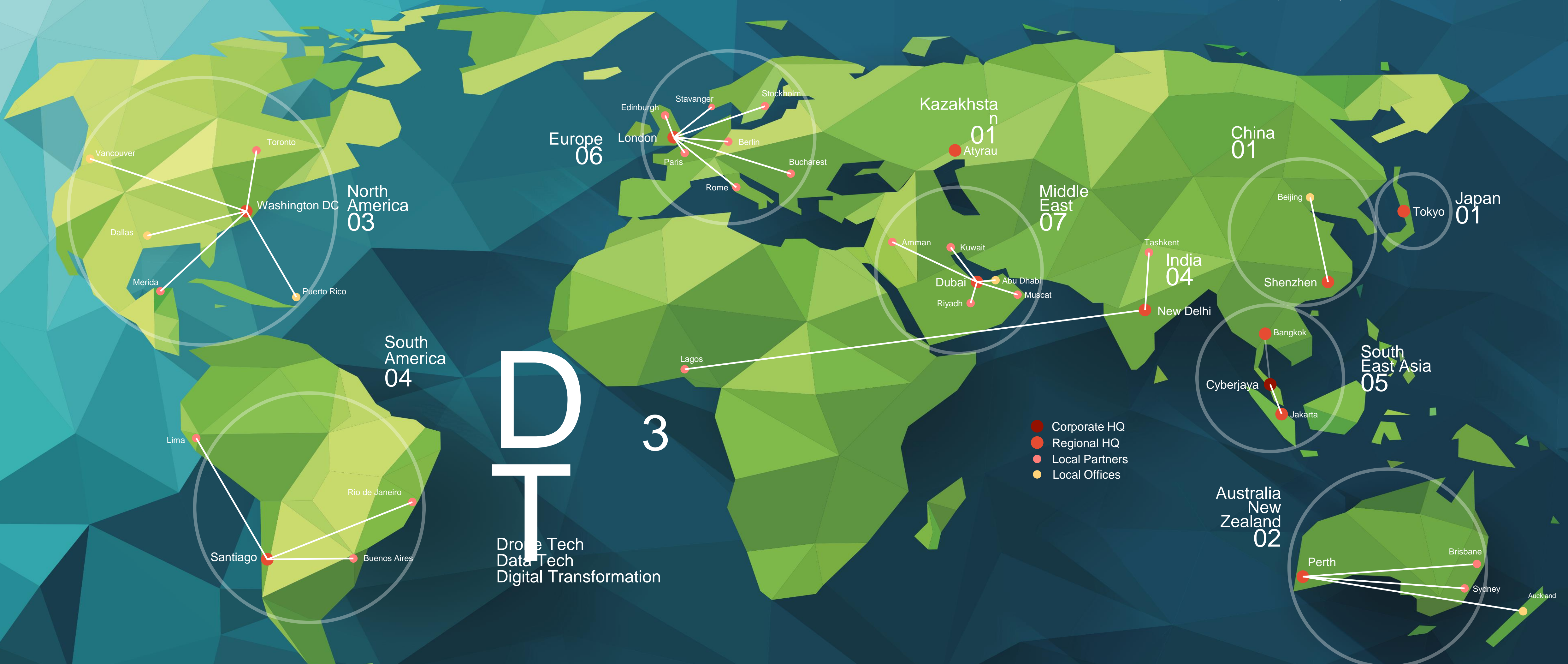
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THANK YOU



Drone-based Technology for HydroPower Asset Inspection and Management Solution



DT
D
T
Drone Tech
Data Tech
Digital Transformation

- Corporate HQ
- Regional HQ
- Local Partners
- Local Offices

CRITICAL ASSET	AGRICULTURE	POWER LINE	TELCO	WIND	SOLAR	OPERATIONS	CREW	RANKING
560,000	265,000	600,000	9,000	7,300	7,000	35	900	1st
ASSETS INSPECTED AS OF DEC 2021	HECTARES AS OF DEC 2021	TOWERS/POLES INSPECTED AS OF DEC 2021	TOWERS INSPECTED AS OF DEC 2021	WTG INSPECTED AS OF DEC 2021	MW INSPECTED AS OF DEC 2021	COUNTRIES GLOBALLY	AERORANGERS GLOBALLY	GLOBALLY IN 2021

DT1 Drone Technology



Global DaaS

- Platform agnostic
- Immediate deployment
- Zero CAPEX
- Zero hassle
- Immediate value

Petrochemical Refinery

Cyberjaya, Malaysia

Weekly Tasks

362

Drilling Operation	145	50%
Exports Rubble	145	6%
Enforcement	145	14%
Wall Panel Placement	145	8%
Installing Flashing	145	21%

Total generated energy

Monthly

12,939 KWh ▼ 6% 84%

Solar Energy

Asset health status

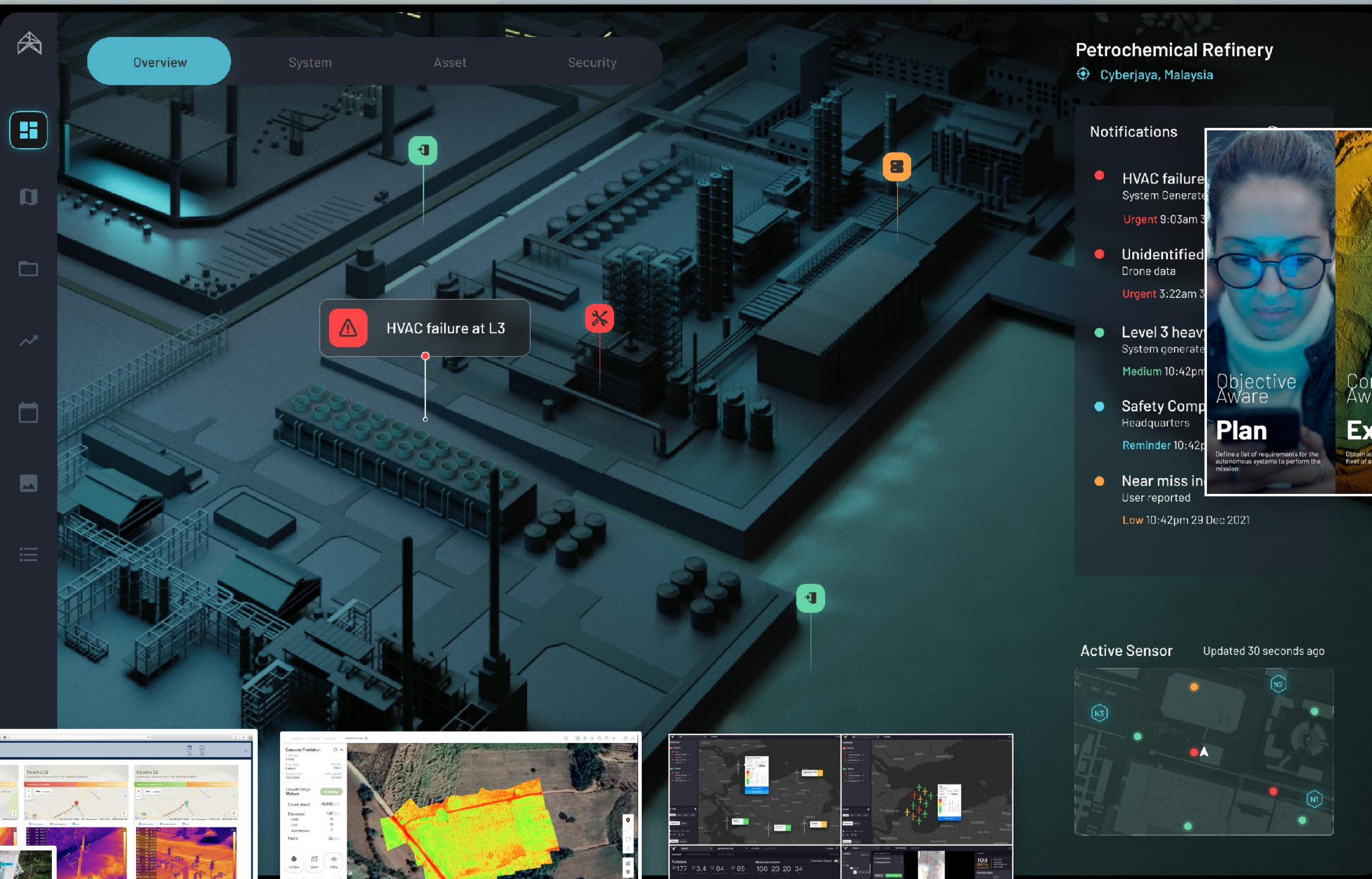
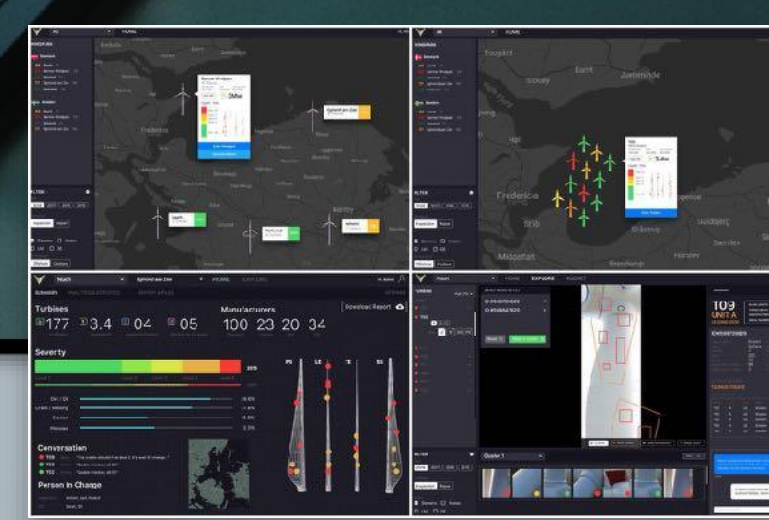
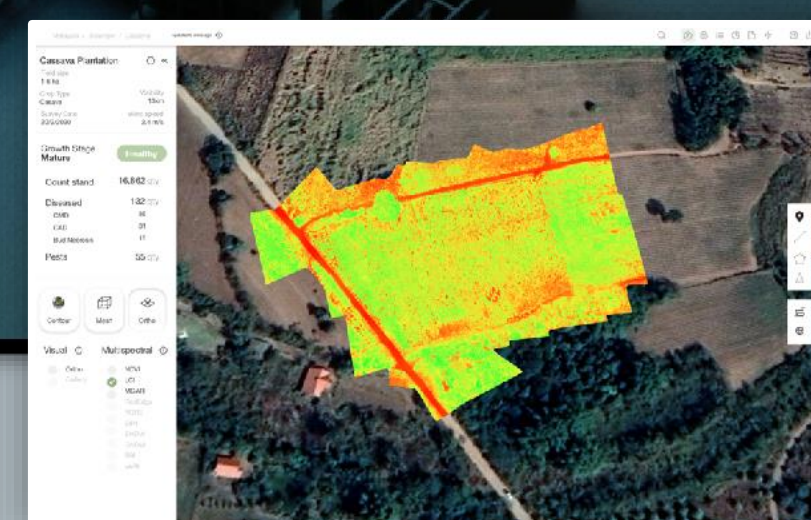
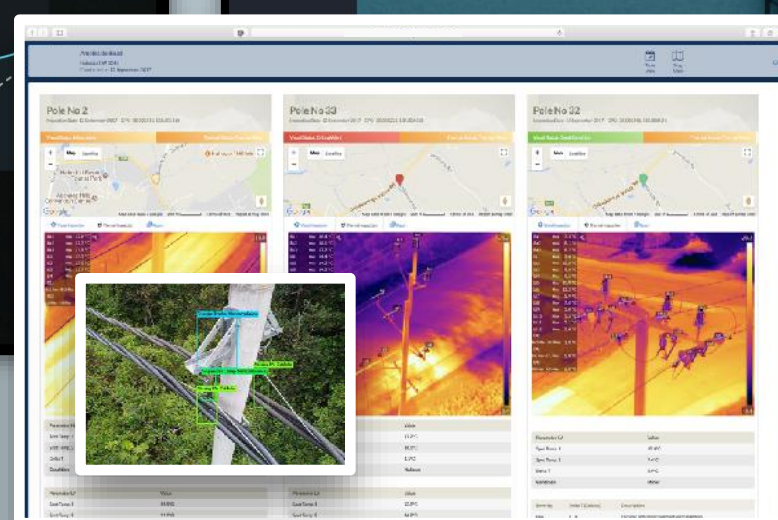
94% Normal 21 Malfunction

Active 245 Inactive 125

Staff Productivity

Day

80 Hours 72 Hours
Time Planned Actual Hours



Next generation
AI driven Drone
Data Intelligence
platform



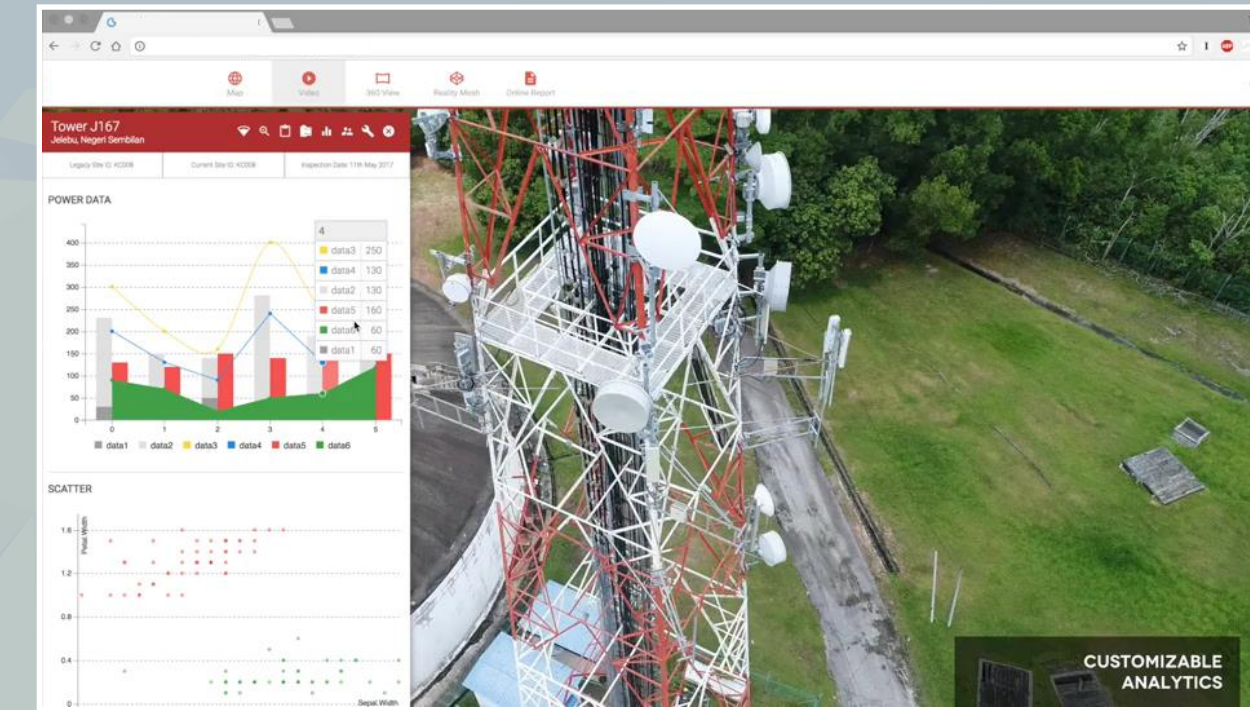
DT3 Digital Transformation



Disruptive Technology DT3 Digital Transformation

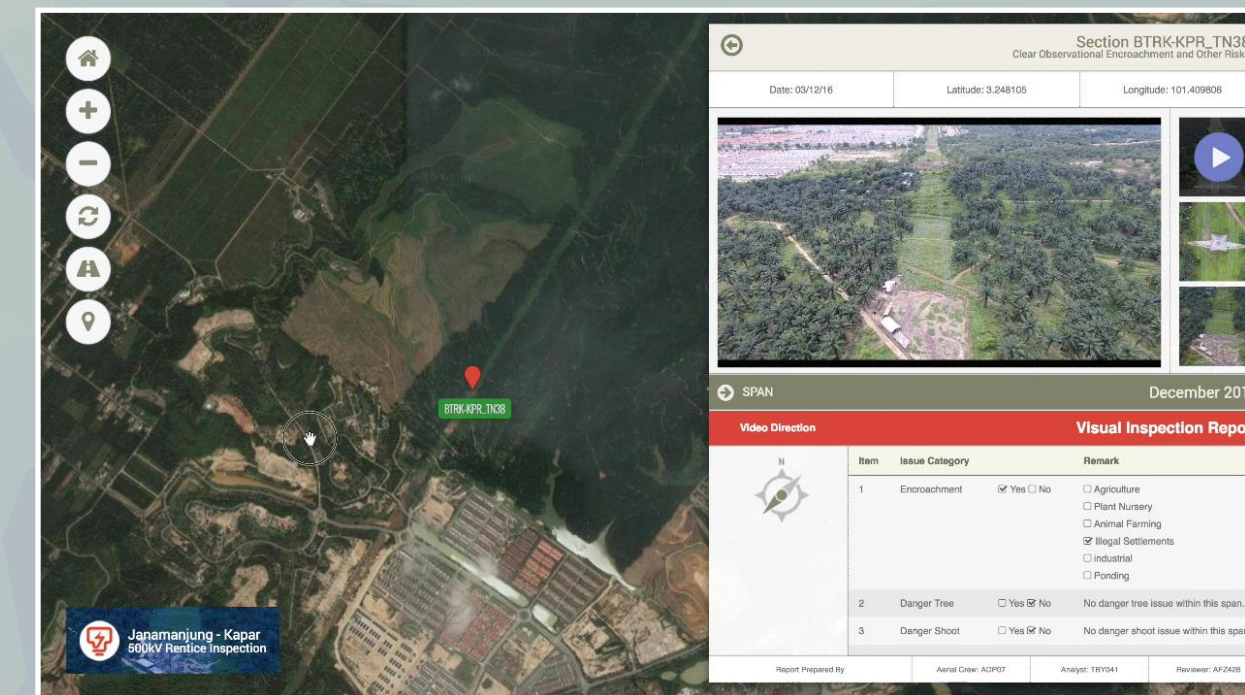
Enabling change in organisations through integrated technologies

Revolutionising how companies operate and deliver value



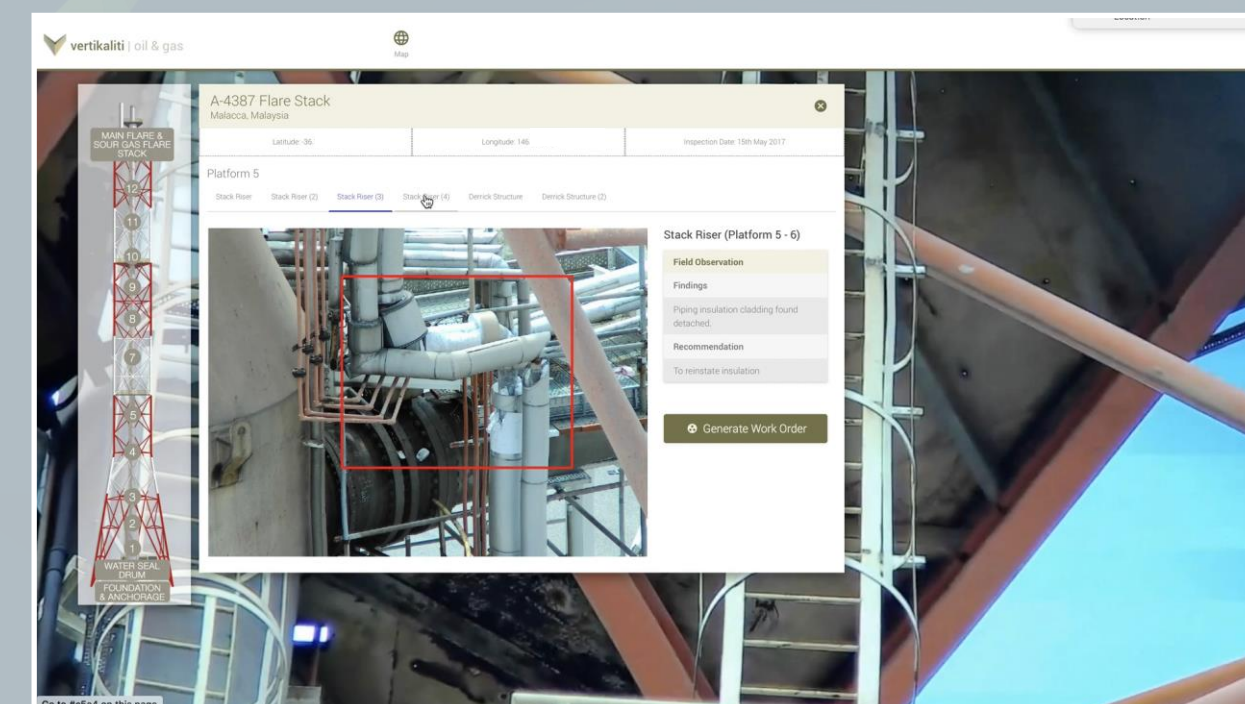
Cell Tower Inspection and Management

up to **500%**
REDUCTION IN
INSPECTION TIME
From 3- 5 Days to 1 day



Power Line Inspection and Management

20%
400%



Oil and Gas Vertical Infrastructure

- Reduce Risks
- Extend Lifespan
- Save Cost
- Min Shutdown

01



SECURITY & SURVEILLANCE

- ▶ Proven 24/7/365 Autonomous Coverage
- ▶ Omnipresent Deterrence
- ▶ **AI Driven** Geospatial Intelligence

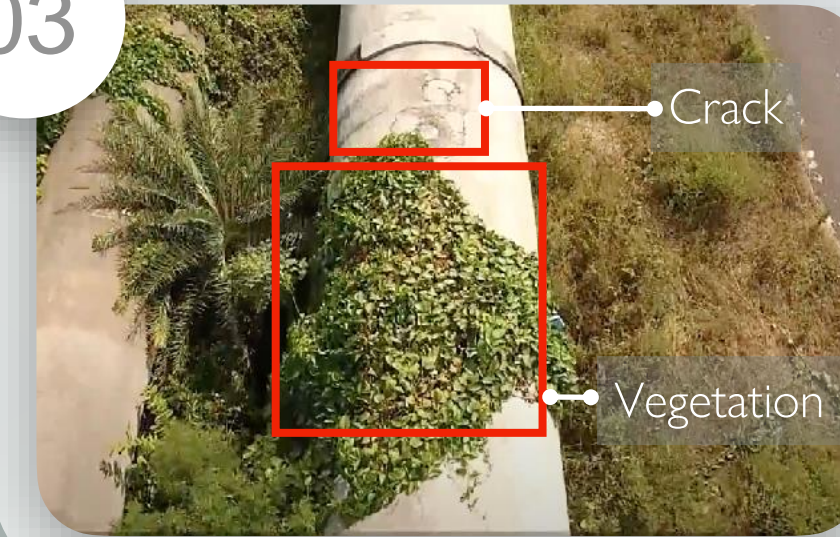
02



CELL TOWER

- ▶ **20%** cost savings
- ▶ **500%** process acceleration

03



OIL & GAS

- ▶ **27%** increase in uptime and reliability
- ▶ **30%** cost savings in project equipment

04



WIND TURBINES

- ▶ **35%** operations cost savings
- ▶ **50%** cost saving in defect marking & categorisation

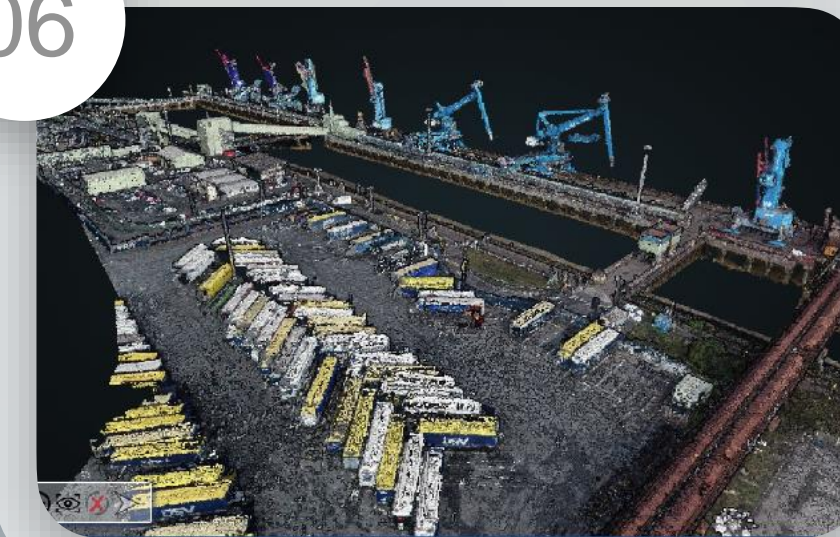
05



SOLAR FARMS

- ▶ **97%** faster than conventional method
- ▶ **\$1,254** average cost savings per MW

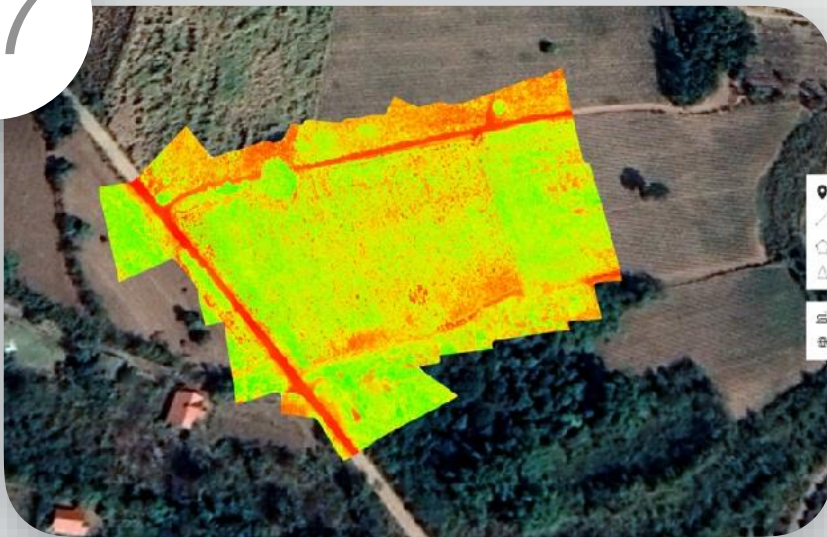
06



PORTS

- ▶ **25%** proven cost savings
- ▶ **55%** less time compared to traditional method

07



AGRICULTURE

- ▶ **500%** operations cost savings
- ▶ **67%** increase in crop yields

08



INFRASTRUCTURE

- ▶ **75%** proven cost savings
- ▶ **3D** Superior 3D modelling and digital twin of assets

09



POWER GRID

- ▶ **30%** cost savings
- ▶ **400%** time savings in project duration

Four Growth Engines

Digitalisation of agriculture's business ecosystem through Agrimor

Consolidation of data platforms for various verticals & solutions onto a single new intelligent platform

AGRIMOR



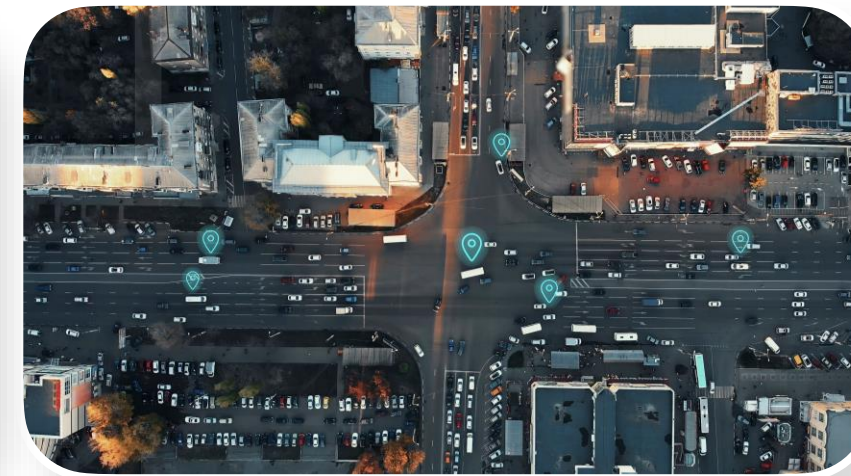
Precision agriculture SuperApp

FULCRUM



Nested Swarm Intelligence System

DRONOS



Next generation drone data platform for DT3

ARGENTAVIS



Commercialising Drone Delivery

4 engines of growth

Streamlining existing verticaliti & myPRISM solutions into new core software technology and adding new verticals; drone delivery (Project Argentavis) & smart collaborative nested system (Project Fulcrum)

Developing & providing the most advanced Autonomous solution though Hardware and Software as a Service (HSaaS)

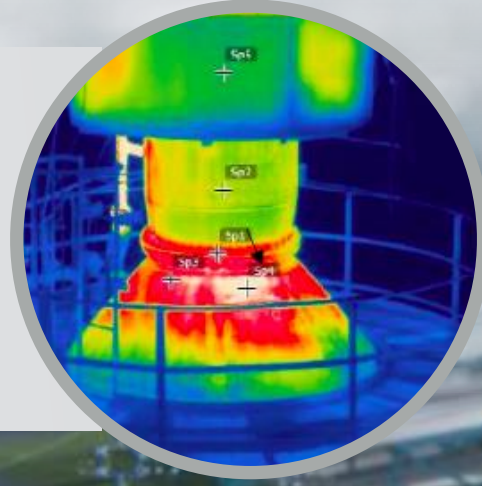
Continues to explore technology partners. Initial deployment to focus on local Malaysian market

Multiple Technology Solutions



Visual & Thermal Inspection

Integrated data platform for analytics, insights and situational awareness



Confined Space Inspection

Inspection in a GPS denied environment such as internal tanks and confined space



Gas Leak Detection

Identify potentially hazardous gas leak via Optical Gas Imaging to improve environmental safety.



Ultrasonic Thickness Inspection

Ultrasonic measurement thickness for metallic structures on elevated, hard to reach areas



Proven Enterprise Level Solution
Managed Services
Immediate Deployment
Immediate Benefits
Zero CAPEX

Commercial Deliveries

Long distance and heavy weight logistic delivery from onshore to offshore or offshore to offshore



Public Safety & AI Surveillance

Deliver public announcement at safe distance and autonomous drone surveillance equipped with intelligent fleet management system to enhance situational awareness



Cathodic Protection Monitoring

IoT based smart pipeline monitoring system that saves cost, safer and environment friendly



Digital Management Platform

Total managed services for asset inspections and management utilising data capture and analytics.



Multiple Inspection Solutions



Visual Inspection
High quality video & images to observe & detects any corrossions & defects



Thermal Inspection
Provide rapid and reliable aerial thermal imaging for defects detection



Confine Space Inspection
Inspection for GPS denied & confined space environment



Gas Leak Detection
Optical Gas Imaging detection of multiple hazardous gas leaks



UT NDT Inspection
Ultrasonic NDT thickness measurement for elevated & hard to reach structures



LiDAR Mapping
Rapid scanning & processing with autonomous capability

HydroPower Plant Turnaround Surveillance

Problem Statement vs Solution

01

Limited HSE surveillance coverage during TA activities

Coverage Limitation

02

More manpower needed to be deployed to monitor SOP compliance

High Manpower

03

Lack of awareness due to less HSE monitoring

Situational Awareness

04

Unable to immediately identify accident occur on site

Slow response of accident detection

Solution : Turnaround Surveillance via Unmanned Aerial Vehicle (UAV)

Wider coverage of HSE monitoring across process area



Remote patrolling UAV capable of handling multiple surveillance



Enhance awareness by making regular patrolling and announcement



Immediate response to accident commander for fast action





Visual & Thermal Inspection

Inspection at elevated asset and hard to reach area



- A compliment inspection method to fill the gap of plant inspection program
- Zero scaffolding cost
- Able to perform inspection at highest possible point of piping and inside pipe culvert
- Fast deployment
- Eliminate the need for working at height
- Comprehensive Digital Reporting



Terms & Conditions

Description of Service

Aerodyne Group provides a platform via its website and app to a community of registered users to engage in a variety of activities, including to capture and display photographs, share comments, opinions and views, primarily Visual Content Database, participate in contests and promotions, register for person membership account.

Acceptance of terms

By using the services, you are agreeing, on behalf of yourself and those you represent, to comply with and be legally bound by these terms as well as our privacy policy and all applicable laws. If you, for yourself or on behalf of those you represent, do not agree to any provision of these terms, you must, for yourself and on behalf any such persons, discontinue the registration process, discontinue your use of the services, and, if you already registered, please cancel your account.

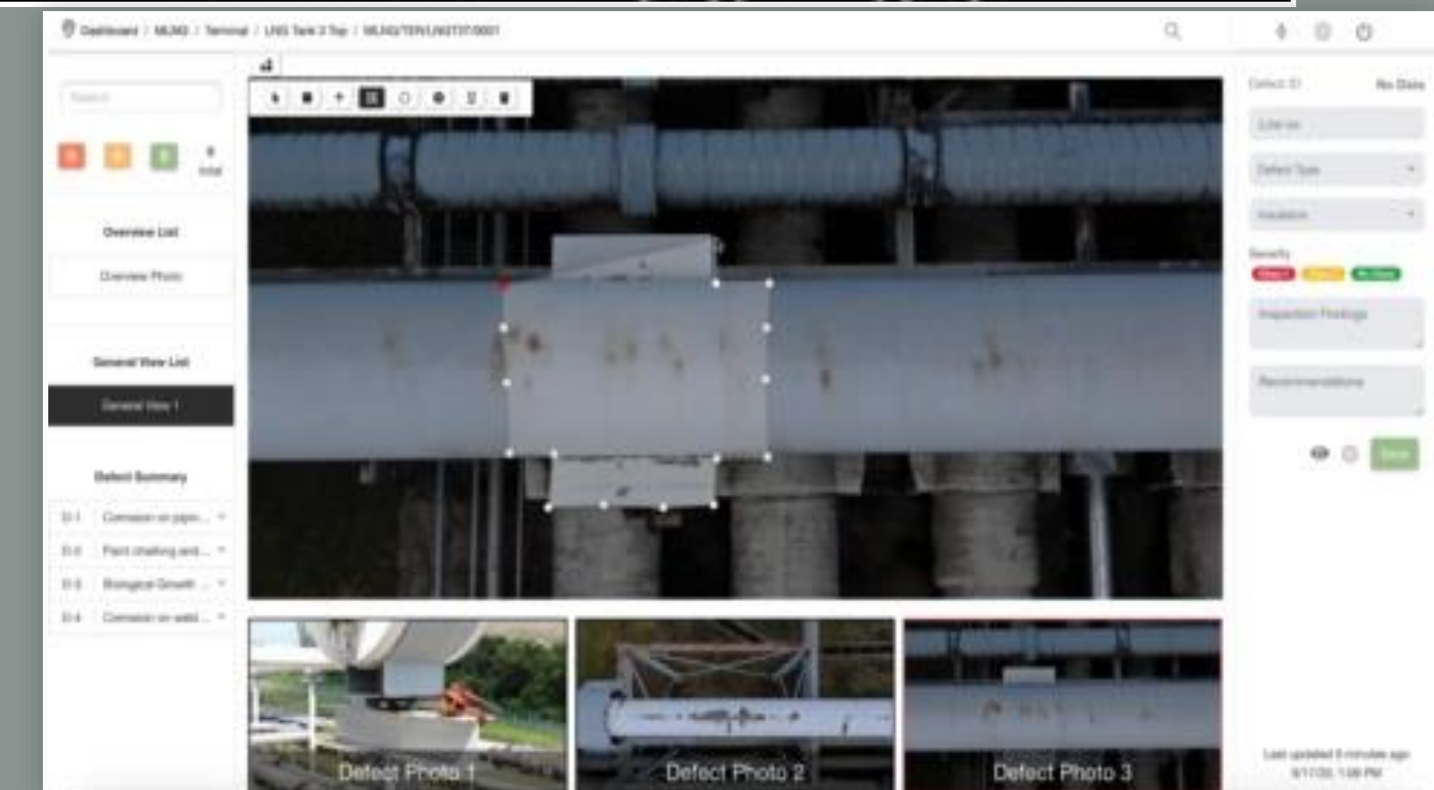
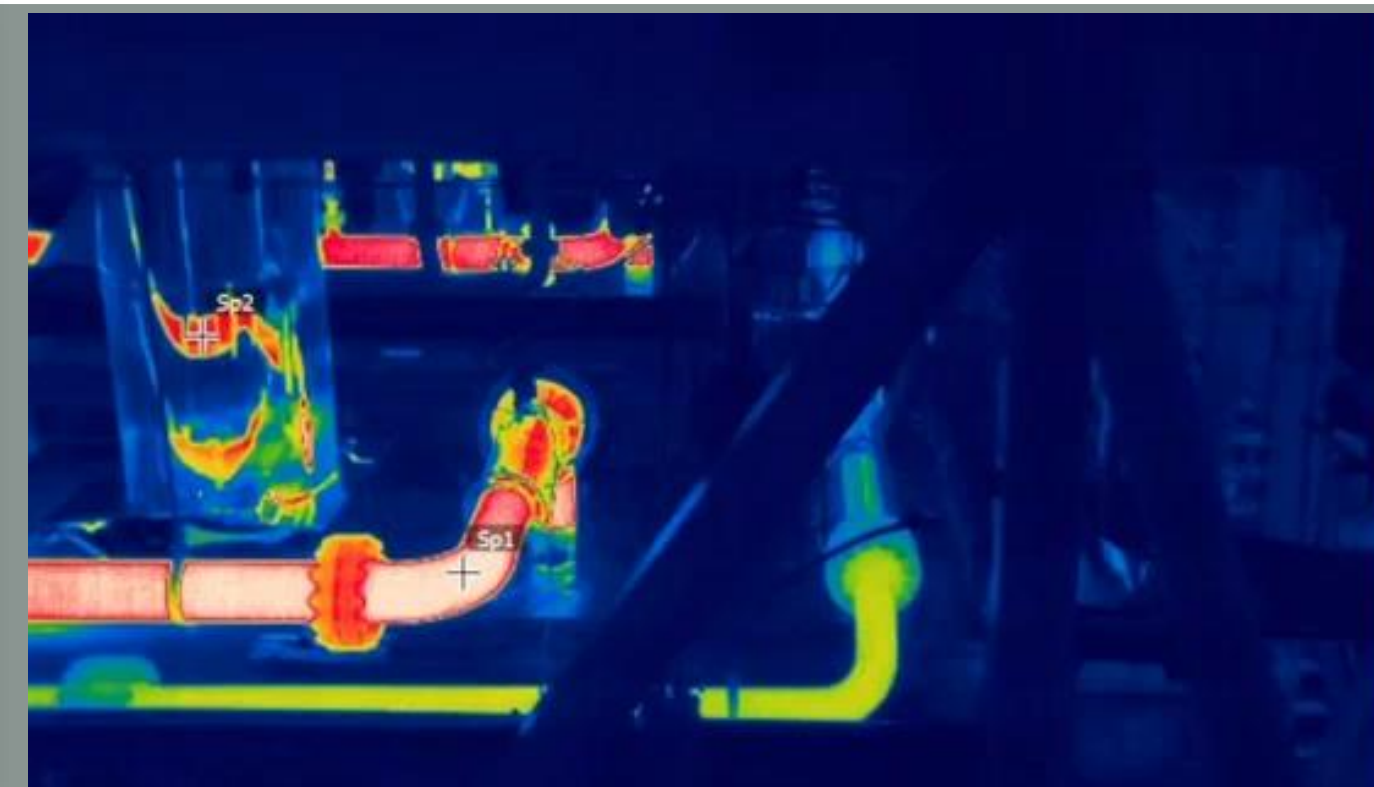
Basically,

We develop a condition based maintenance report to assist infrastructure owners manage their assets better. We will develop more features and services in the future.

Basically,

By using our platform, you agree to all the terms.

Condition Based Maintenance

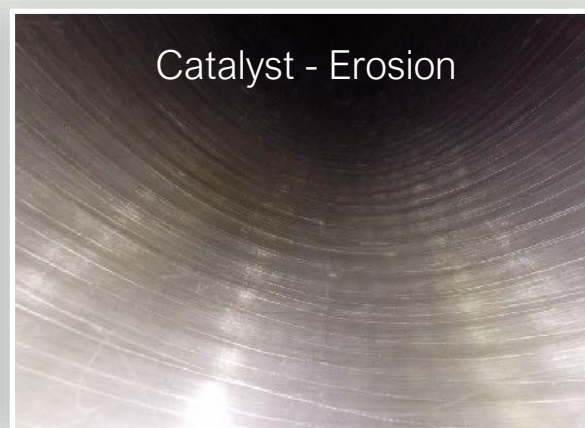
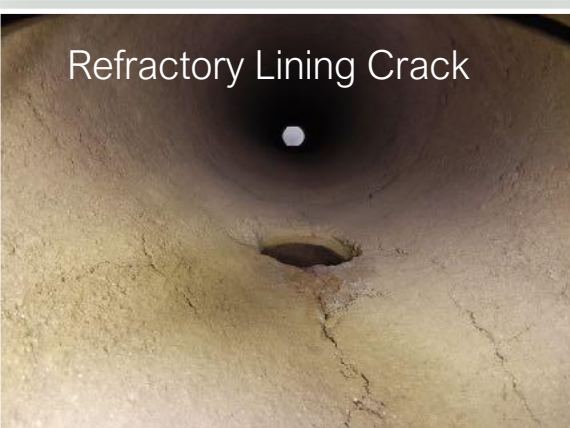
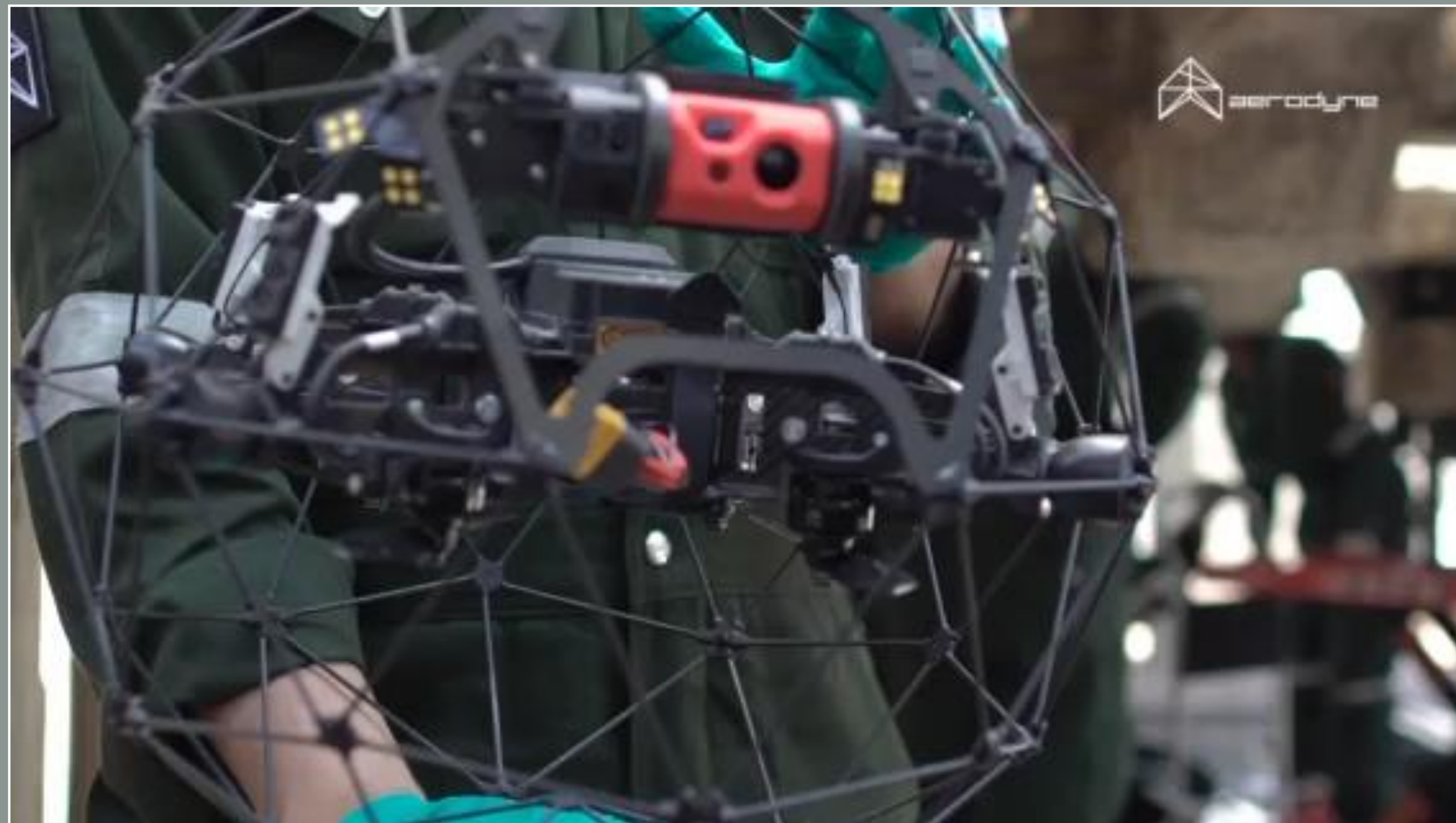




Confined Space Inspection

Capture every inch of complex & confined asset from safe location

- Eliminate the need for human entry
- Safer access to GPS-denied environment than conventional access methods.
- Faster inspection results by eliminating complex scaffolding erection in confined space.
- Close-up inspection

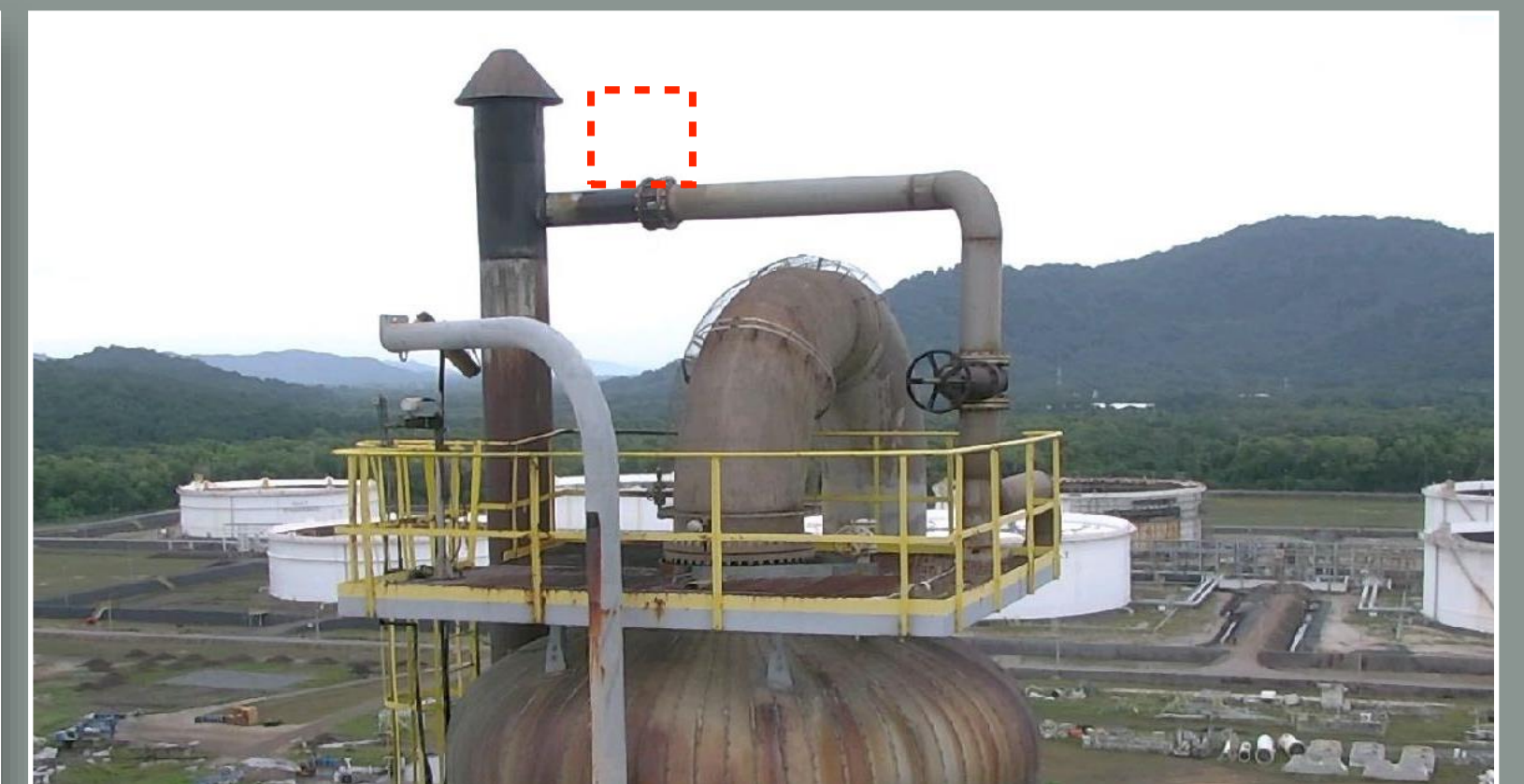
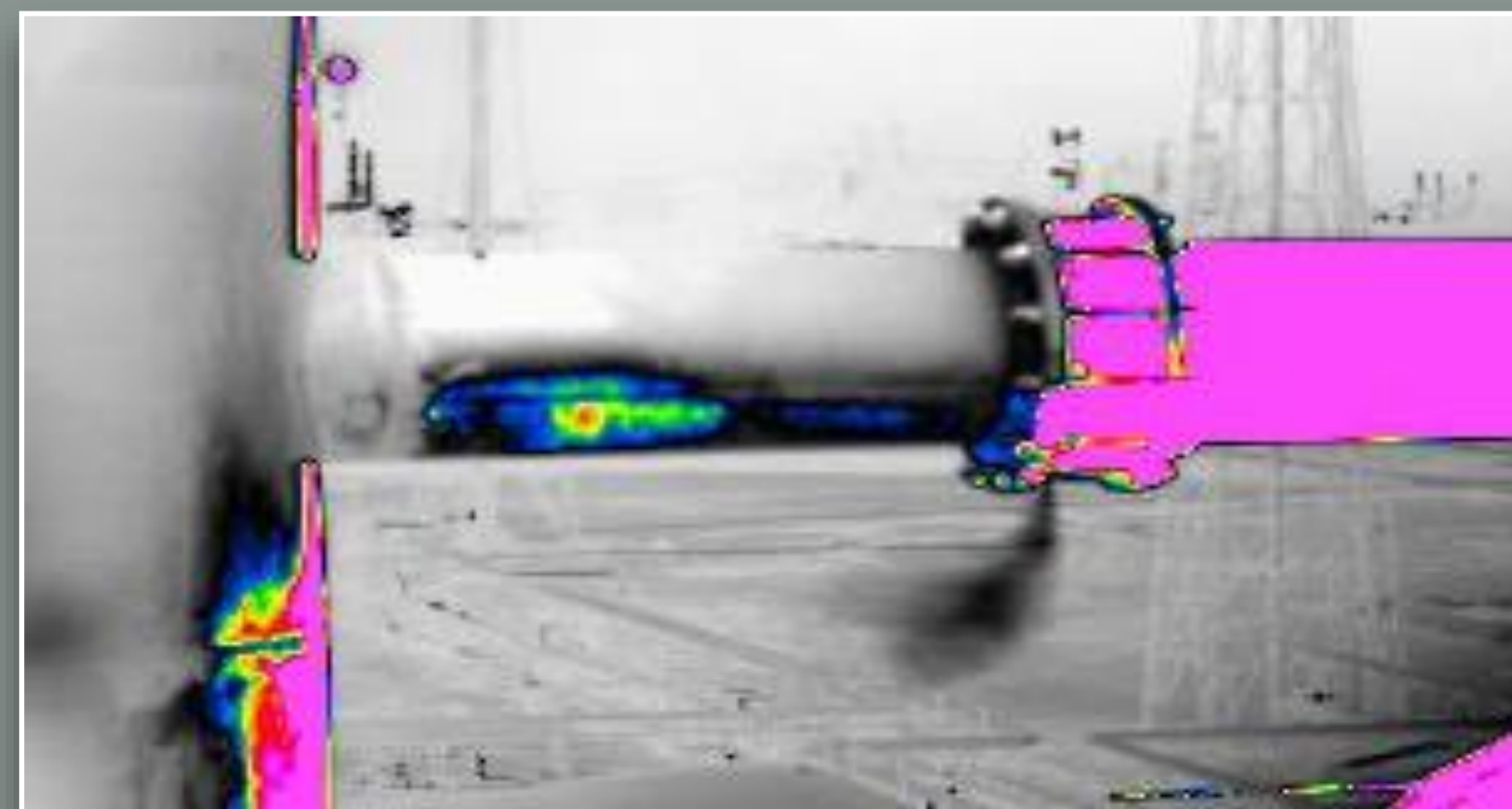




Gas Leak Detection

A safer & faster deployment of gas leak survey

- Eliminate close range human presence in gas leak area during survey activity
- Complementary to Existing Program such as: LOPC, LDAR, Zero Leak Start-up, flanges integrity management
- Faster speed of gas leak survey
- Eliminate the need for working at height
- Zero scaffolding cost
- Early detection to prevent catastrophic incident





Ultrasonic Thickness Inspection by Voliro

UT at elevated locations and hard to reach areas.

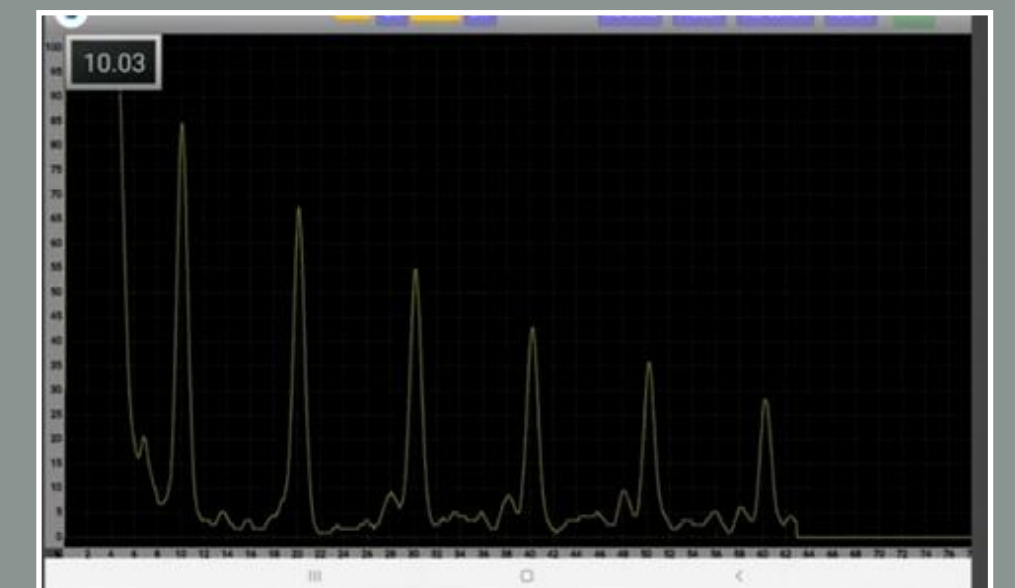
- Tiltable rotors that enable six degree of freedom movement
- Extremely stable contact-based NDT with surfaces
- Fast & accurate data $\pm 0.05\text{mm}$
- Can be equipped with multiple sensors & payload



Industrial grade drone



Easy and immediate deployment



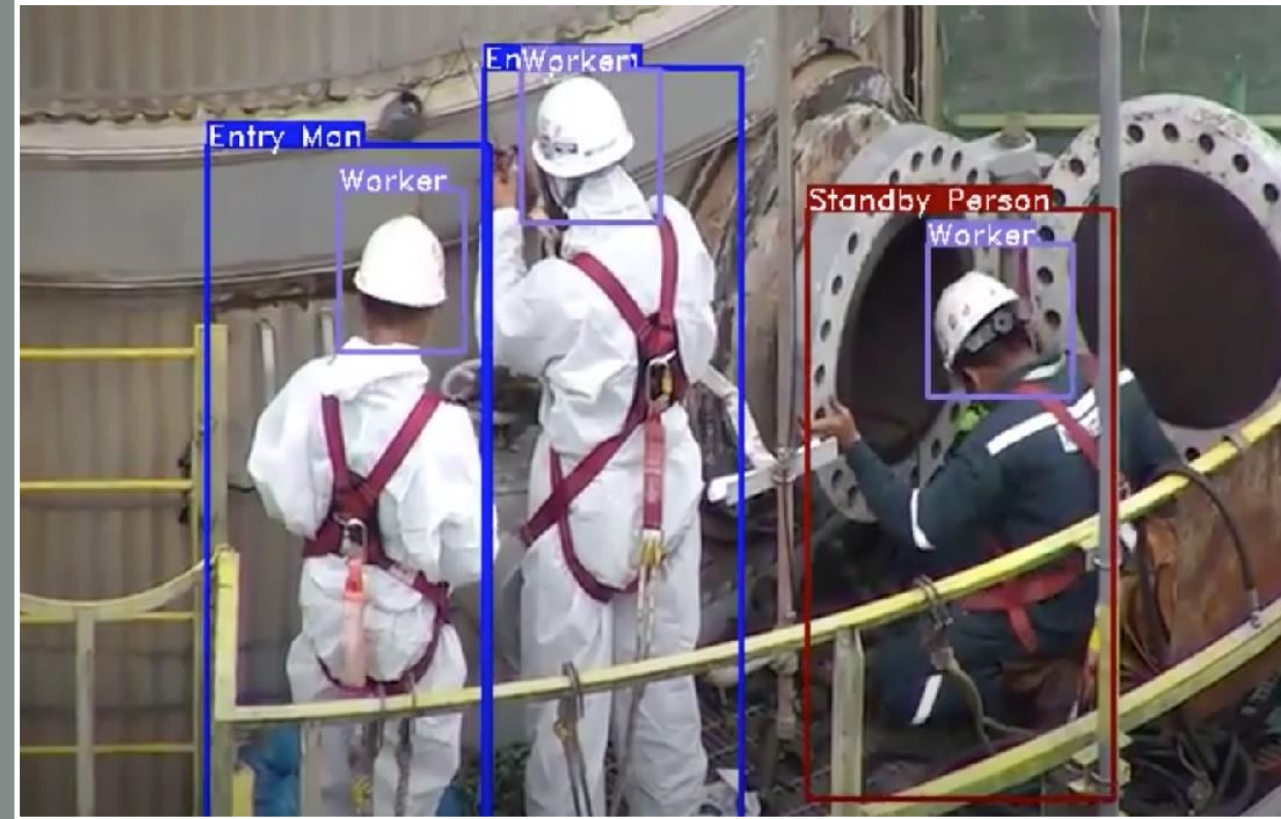
View real-time data



Ai HSE TA Surveillance

HSE Surveillance & COVID-19 Preventive Measure

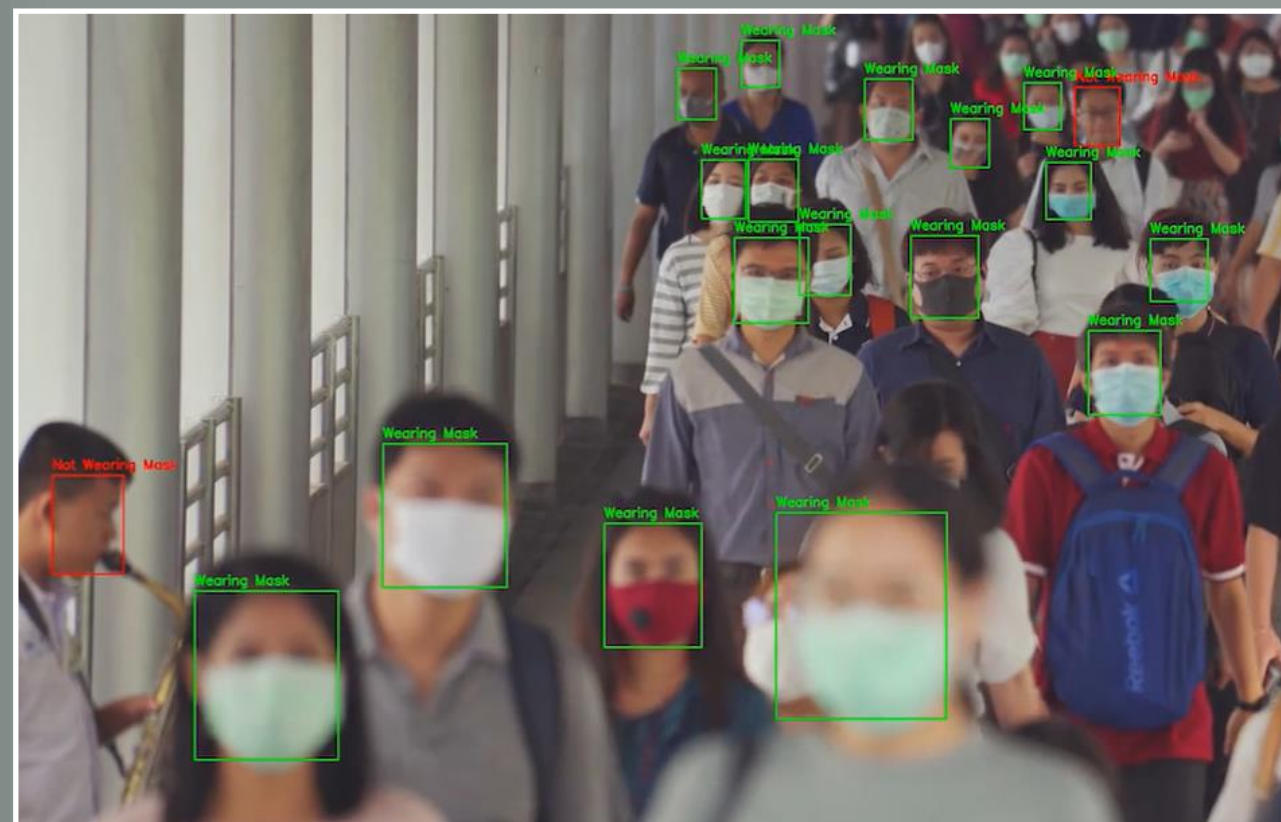
- Artificial Intelligence (Ai) Technology
- Ensure compliance to social distancing
- Human & object tracking
- Face mask & PPE compliance
- Public announcement
- Remote patrolling



PPE Compliance



Fencing & Intrusion Detection



Facial Mask Detection



Face Recognition

Other Capabilities

- Facial/Posture Recognition and Identification
- Distance Measurement
- Detection and Identification of Anomalies
- Vehicle Plate Number Identification
- Suspicious Behaviour Detection
- Threat Detection & Alert
- Working at Height SOP



Project Progress and Monitoring

Hyperlapse Video



Deliverables

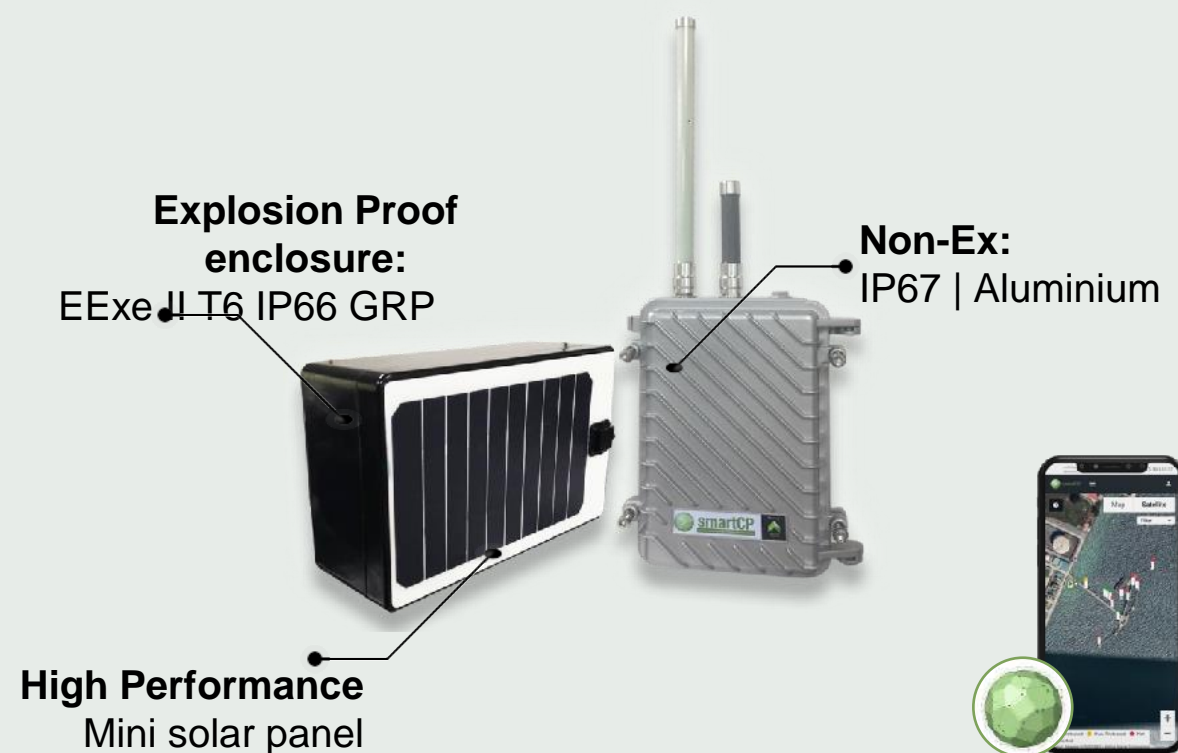
- Aerial Photos and Videos
- 3D Visualisation
- 360 Tour
- Time Lapse
- Daily Progress Monitoring
- Volumetric Measurements
- Reports Progress Generation



SmartCP

Advance Remote Cathodic Protection Monitoring System

- Significant time saving with automated and instantaneous data retrieval
- Eliminate risk associated with working at remote and harsh environment
- The time spent on mundane task can be better utilized for analysis and further troubleshooting
- Increases data reliability and accuracy by eliminating human error



Fulcrum



24x7 Operations

- Maintain drone operations day and night, through various weather conditions without any pilot on-site.



Automated

- Advanced navigation and control systems to deploy, recover and recharge drones automatically



Remote

- Connect to the platform remotely over the 4G/5G and secured local area networks.

Security

Automated Perimeter Security

Significantly reduces the time spent by security guards on patrols, whilst improving the surveillance effectiveness and cost across the site.

Automated Alarm Response

Enables drones to be automatically deployed to rapidly respond to alarms and provide actionable data to security teams on the ground.



Facilities Management

Routine Patrolling

Large area surveillance can safely and quickly be performed for better situational awareness.

Infrastructure and Facility Inspection

Reduces the time and cost to conduct inspections. Eliminates the risks of unsafe conditions while improving the inspection frequency



Emergency Response

Rapid Deployment

Our technology provides response teams with a rapid-response aerial solution that can be deployed to incident sites.

Live Video Streaming

Live video streams from the drone is simultaneously made available to multiple ground response teams, improving awareness and facilitating coordination.

