COPTRZ™

2026 EDITION

SEE THE WORLD DIFFERENTLY

Drone Surveying Guide

Everything you need to know about drone surveying - tech, data, and ROI insights

The integration of drones in surveying has transformed industry practices, facilitating rapid and secure data collection processes. This innovation not only cuts down on costs but also enhances insights, empowering more informed and strategic decision-making. Recognising the significant advantages offered by drone technology, companies in the AEC industry are increasingly embracing its adoption. This guide aims to provide comprehensive insights into the diverse applications of drone technology in surveying, complemented by an overview of our state-of-the-art solutions tailored to meet industry needs.

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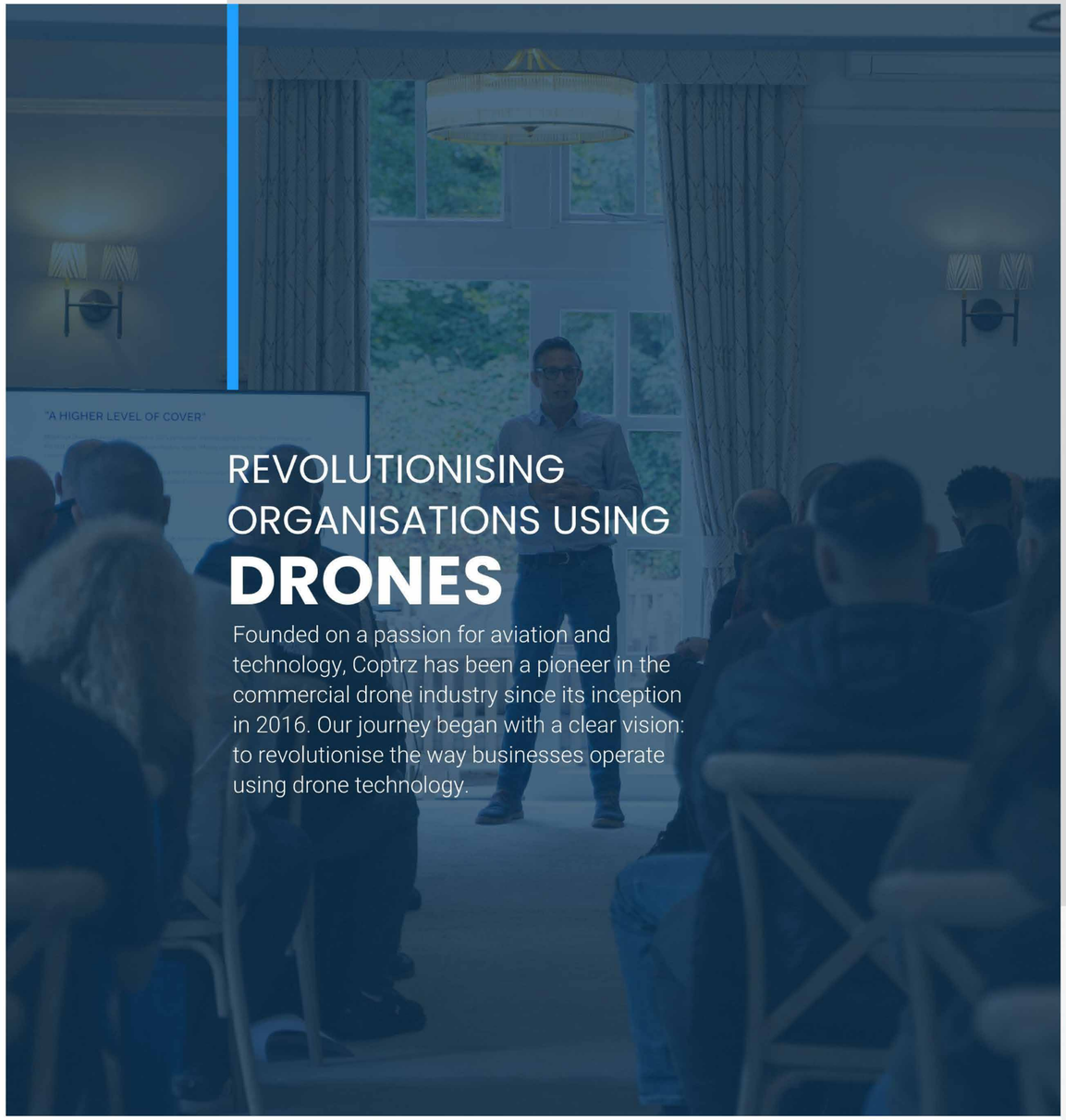


REVOLUTIONISING ORGANISATIONS USING

DRONES

Founded on a passion for aviation and technology, Coptrz has been a pioneer in the commercial drone industry since its inception in 2016. Our journey began with a clear vision: to revolutionise the way businesses operate using drone technology.

ALL YOU NEED TO KNOW

About Coptrz

Over the years, Coptrz has grown exponentially, becoming a leading authority in commercial drone solutions. Our commitment to excellence has driven us to constantly innovate and expand our services. We've partnered with industry giants, contributed to groundbreaking UAV research, and developed bespoke drone solutions that have set industry standards.

Industry Specialists

We have a team of industry experts across Inspection, Surveying, Public Safety, & Education for ongoing support.

One-Stop-Shop

We have everything you need in one place including hardware, software, training and technical support.

Exclusive Technology

Coptrz has the UK's widest range of industry leading aerial inspection solutions.

OFQUAL Courses

Go on to the next level and become a Chief Drone Pilot with our exclusive accredited courses.

World-Class Suppliers

Your perfect drone solution will be custom built from a range of world-renowned suppliers.

Expert Training

You will have access to industry-leading training including specialist courses in Thermography, OSC/BVLOS and 3D Mapping.

Our mission is to harness the power of UAV technology to deliver measurable benefits to your business. Whether it's enhancing efficiency in data collection, providing cutting-edge aerial photography, or ensuring precision in industrial inspections, Coptrz is dedicated to propelling your company to new heights. We don't just offer drones; we deliver the future of commercial aerial intelligence.

Today, Coptrz stands as a testament to where ambition and technology can lead. With over 30 industry-leading partners from across the globe, we have managed to assist over 2,000 business from the initial implementation of drone technology, to running fully-fledged drone programmes. We take pride in our history, our achievements, and the trust that our clients place in us.

GET TO KNOW THE INDUSTRY

Industry Overview

The construction and surveying industries are undergoing significant transformation, with contractors actively pursuing innovative technologies to improve productivity, efficiency, and safety. Drone technology has emerged as a novel category of solutions designed to meet these evolving needs. Historically, surveying and Geographic Information Systems (GIS) operated as distinct domains. Yet, the integration of drones and advanced visualisation software has facilitated the convergence of these realms.

Increased Speed

Capture data faster than current methods of surveying

With their manoeuvrability and advanced sensing systems, UAVs are significantly reducing the time required to conduct surveys across a whole host of landscapes. By swiftly covering vast areas from above, drones eliminate the need for labour-intensive ground surveys, expediting the data collection process. This accelerated pace not only enhances productivity, but also enables surveyors to adhere to project deadlines and rapidly assess changing conditions on-site.

Improved Data

Capture data in areas hard to reach areas

Drones enable surveyors to capture data from more diverse perspectives, capturing intricate details of landscapes, structures, and terrain with clarity and precision. This level of detail enables surveyors to identify subtle features and anomalies that may have been overlooked using conventional surveying techniques, thereby enhancing the overall reliability of survey data.

Cut Costs

Cut costs by reducing job times and labour costs

Drones offer access to remote or challenging terrain that may be difficult or costly to survey using traditional methods. By navigating these areas, drones eliminate the need for specialised equipment or infrastructure, reducing overall surveying costs. The additional ability to cover vast areas reduces job timelines and further reduces labour costs, enabling surveyors to take on more projects within a given timeframe, thereby increasing revenue potential.

POPULAR USES OF DRONES

Applications

Infrastructure Planning

Aerial survey data is invaluable for creating detailed topographical models of sites, vital for pre-construction engineering assessments. This data seamlessly integrates with CAD or BIM platforms, allowing engineers to swiftly delve into 3D modelling. The low cost of drone surveys makes them an ideal choice for regular monitoring during a project's lifecycle, enabling teams to track progress and identify potential issues. By overlaying drone images onto initial designs, real-time insights into construction advancements can be aligned with plan specifications.

Land Surveying

Drones can produce orthomosaics and detailed 3D renderings that enable rapid generation of cadastral maps, even in challenging or remote environments. Aerial images captured by drones allow for clear identification of features such as signage, curbs, road markings, and drainage systems, enhancing their utility for asset management purposes. Through post-processing techniques, images are further refined to generate detailed elevation models, contour lines, and break-lines, providing insights into terrain characteristics and topographical features.

Volumetrics

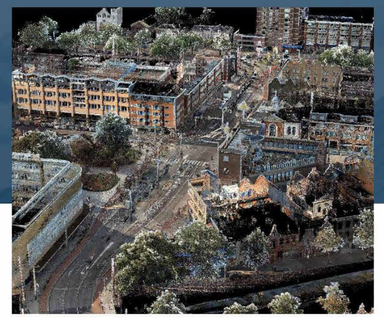
Utilising orthophotos generated from drone data, surveyors can efficiently compute distances and surface areas, facilitating tasks like stockpile monitoring. Additionally, 3D mapping tools enable professionals in mining or quarrying to conduct accurate volume calculations using drone-acquired data, thereby enhancing inventory management and providing comprehensive oversight of stock levels.

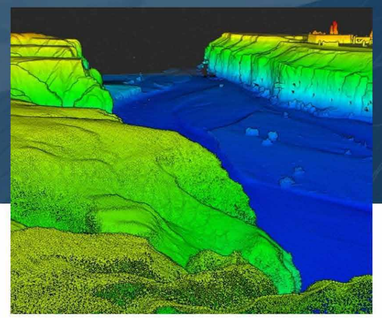
Slope Measurements

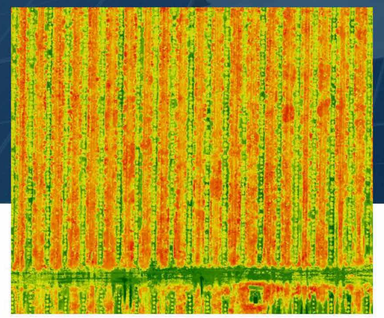
Imagery and data captured via drones can be used for the measurements of slopes, enabling the direct determination of ground surface gradients and segmentation of regions. This information is invaluable for strategising slope oversight, which plays a pivotal role in landslide prediction and mitigation efforts. Sequential orthomosaics can pinpoint shifts in terrestrial movements and their rates, aiding in the prediction of geological events.

DRONE DATA EXPLAINED

What the Camera Sees







Photogrammetric Data

Photogrammetry is a widely utilised technique in drone mapping, leveraging aerial imagery captured by drones to generate detailed and accurate 3D models of the terrain, objects, or structures on the ground. In this process, drones equipped with high-resolution cameras capture overlapping images of the area of interest from different angles during flight. These images are then processed using photogrammetry software, which analyses the overlapping features and calculates the spatial relationships between them to reconstruct the three-dimensional geometry of the scene.

One of the primary advantages of photogrammetry for drone mapping is its accessibility and cost-effectiveness. Drones equipped with cameras are relatively affordable and widely available, making photogrammetry a practical solution.

LiDAR Data

LiDAR, which stands for Light Detection and Ranging, is a remote sensing technology that measures distances to objects or surfaces using laser pulses. It operates on the principle of emitting laser beams towards the Earth's surface and measuring the time it takes for the light to return after hitting an object or surface. This data is then used to create detailed three-dimensional maps or models of the terrain, objects, or environments being scanned.

LiDAR is widely used for creating high-resolution digital elevation models (DEMs), topographic maps, and three-dimensional terrain models. Unlike photogrammetric sensors, LiDAR sensors can penetrate vegetation and other obstructing elements to capture the underlying terrain. This makes it particularly useful for mapping areas with dense vegetation or complex terrain where traditional photogrammetry methods may struggle to provide accurate results.

Multispectral Data

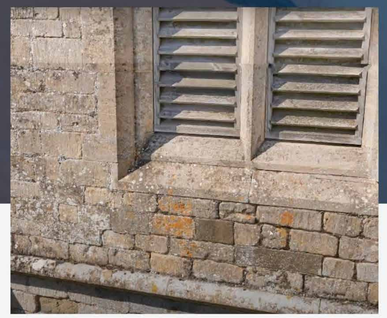
Multispectral imaging is a technique used to capture images at specific wavelengths across the electromagnetic spectrum beyond what the human eye can perceive. Unlike standard RGB (Red, Green, Blue) imaging, which captures only three bands of light, multispectral imaging captures data across multiple bands, typically ranging from ultraviolet (UV) to near-infrared (NIR) wavelengths.

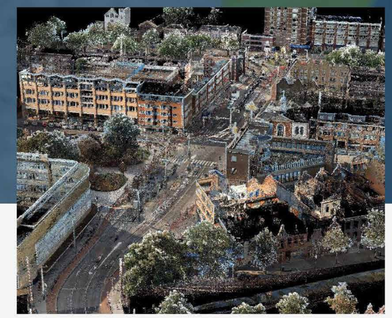
In multispectral imaging, sensors are equipped with filters or detectors that selectively capture light within predefined spectral bands. Each band represents a specific range of wavelengths, and by analysing the intensity of light within each band, multispectral imaging can reveal valuable information about the objects or surfaces being observed.

This data is particularly useful for crop management. For example, near-infrared light is often used to gauge biomass vitality, while other wavelengths can provide insights into moisture levels, chlorophyll content, and early signs of diseases or pest infestations.

DRONE DATA EXPLAINED

Understanding the Outputs





3D Textured Mesh

A 3D textured mesh is a digital representation of a 3D object or scene that includes both geometric information and surface textures. Meshes are created by capturing multiple images of the object from different viewpoints and then processing these images to generate a 3D model.

The geometric information in a 3D textured mesh consists of the object's shape and structure, represented as a collection of vertices, edges, and faces. These elements define the object's surface geometry and spatial relationships, allowing it to be accurately visualised and manipulated in 3D space. The result is a model that captures the shape of the object in a visually appealing way. While a 3D textured mesh excels in presenting and visualising the model, especially for online sharing and display, it prioritises aesthetics over precision. Due to this emphasis on appearance rather than accuracy, it's not typically recommended for tasks that require precise measurements.

Orthomosaic

An orthomosaic is essentially a 2D map where each point is defined by its X and Y coordinates and colour information. This map is characterised by its uniform scale, making it ideal for accurate 2D measurements like distance and surface area. It addresses and corrects key issues inherent in input images, such as the camera's perspective and the varying scale caused by different distances of objects or ground from the camera.

This process of creating an orthomosaic goes beyond simple photo stitching; it involves a sophisticated method of aligning and adjusting images to ensure a consistent scale and accurate representation of the Earth's surface.

Orthomosaics are highly valuable for their precise, true-to-scale representation of the Earth's surface, offering detailed surface information which is essential in various fields. Their consistent scale allows for accurate 2D measurements.

Point Cloud

A point cloud is a collection of data points in a coordinate system. Each point is defined by 3D position (X, Y, Z), which represent the external surface of an object or area in 3D space. When these points are plotted, they form a visual representation of the surface of the scanned object or terrain. The result looks like a "cloud" of dots, hence the name point cloud.

Point clouds are highly valued for their ability to precisely and accurately capture the physical characteristics of real-world objects. This makes them indispensable for 3D modelling in both LiDAR and photogrammetry.

These models are valuable for urban planning, land development, environmental monitoring, and construction projects.

Solutions

Drones

DRONE

DJI
Matrice 4 Enterprise

Wide Camera
20MP 4/3 CMOS

Tele Camera
1/1.3-inch CMOS,
Effective Pixels: 48MP

Shutters
Electronic Shutter:
2-1/8000 s

Mechanical Shutter:
2-1/2000 s

Photo Formats
JPEG/DNG (RAW)

Flight Time
49 Minutes

IP Rating
No Rating

Weight
1219g

Overview
The DJI Matrice 4 Enterprise is a next-generation drone tailored for high-precision surveying and construction applications. It features an advanced multi-camera system, built-in RTK for centimetre-level accuracy, and powerful AI tools that streamline workflows like 3D modelling, terrain mapping, and site inspections. With extended flight time, rapid multi-directional image capture, and robust safety systems including obstacle avoidance and GNSS-free navigation, it's built to handle complex environments with speed and reliability. Ideal for professionals needing efficient, large-scale data collection and detailed site analysis.

DRONE

DJI
Matrice 4 Thermal

Thermal
Uncooled Vanadium
Oxide (V0x)

Wide Camera
12MP/48MP

NIR Auxiliary Light
Infrared Illumination
(FOV: 5.7°±0.3°)

Image Formats
JPEG

Flight Time
49 Minutes

IP Rating
No rating

Weight
1219g

Overview
The DJI Matrice 4 Thermal is a high-performance drone built for advanced surveying and construction tasks that require thermal imaging. It combines a high-resolution thermal camera, visual camera, and laser rangefinder to provide precise measurements and heat detection across job sites, making it ideal for inspecting infrastructure, monitoring utilities, and identifying energy inefficiencies. With built-in RTK for centimetre-level accuracy, intelligent mapping modes, and up to 49 minutes of flight time, it delivers efficient and reliable data collection. Its enhanced AI features, obstacle avoidance, and robust low-light capabilities ensure safe, accurate operation in complex environments, making it a powerful tool for construction professionals and surveyors alike.

DRONE

DJI
M4D

Wide Camera

20MP 4/3 CMOS

Tele Camera

1/1.3-inch CMOS,
Effective Pixels: 48MP

Shutters

Electronic Shutter:
2-1/8000 s

Mechanical Shutter:
2-1/2000 s

Photo Formats

JPEG/DNG (RAW)

Flight Time
49 Minutes

IP Rating
IP55

Weight
1850g

Overview

The DJI Matrice 4D is a rugged enterprise-grade drone well suited for surveying and mapping tasks, featuring a triple-camera system including a 20 MP wide-angle 4/3□ CMOS and dual 48 MP tele cameras for high-resolution capture, a laser range finder capable of measuring up to about 1,800 m with high accuracy, and an IP55-rated design that enables operation in challenging environments between roughly –20 °C and +50 °C. It offers up to around 54 minutes of flight time in ideal conditions and supports enterprise positioning workflows, making it an efficient tool for aerial mapping, progress tracking, and 3D modelling in construction and inspection fields.

DRONE

DJI
Matrice 400

Multi-Payload Support

Sensing Type

Omnidirectional
Binocular Vision System

(Surround view provided
by full-colour fisheye
vision sensors)

Horizontal Rotating LiDAR

Upper LiDAR & Downward 3D Infrared Range Sensor

Six-direction mmWave
Radar

Flight Time
59 Minutes

IP Rating
IP55

Weight
15.8kg

Overview

The DJI Matrice 400 is a powerful enterprise drone built for high demand surveying and construction applications. It supports payloads of up to 6 kilograms, allowing it to carry advanced equipment such as LiDAR sensors, high-resolution photogrammetry cameras, thermal imaging units, and other specialized tools for inspection and mapping. With a flight time of up to 59 minutes, it offers extended mission capability over large or complex sites. The drone is equipped with six-direction obstacle sensing using LiDAR, radar, and visual systems, ensuring safe operation in dynamic environments. It also features RTK for centimetre-level accuracy, making it ideal for precise topographic surveys and infrastructure assessments. The Matrice 400 integrates with DJI's enterprise software for automated flight planning, real-time data capture, and seamless coordination with other site management tools. This makes it a versatile and reliable solution for large-scale construction monitoring, site modelling, and asset inspection.

DRONE

FLYABILITY
Elios 3

Collision-Tolerant Design

Real-Time Mapping

Plug & Play Payload Bay

Return to Signal

Flight Time
12 minutes

IP Rating
IP44

Weight
1900g

Overview

The Flyability Elios 3 is a sophisticated indoor drone designed for mapping and inspection, featuring cutting-edge technology for precise and efficient data collection. It is equipped with the FlyAware™ SLAM Engine for centimetre-accurate indoor GPS, enabling it to build real-time 3D maps for instant situational awareness. Its SLAM-based stabilisation provides unmatched stability, even under challenging conditions. The drone features a modular payload bay, allowing for versatile configurations with high-precision LiDAR data and dedicated payloads for close-up inspections. It also boasts a collision-resilient rugged design, an extended flight time of up to 12 minutes, and a Return-To-Signal feature for enhanced flight safety.

DRONE

PARROT
ANAFI AI

1-Click Photogrammetry

4G Connection
Internet Connectivity

Zoom Camera
48MP
6x Zoom

Cybersecurity
AES-256 Encrypted
Made In The USA

Flight Time
32 minutes

IP Rating
IP53

Weight
898g

Overview

The Parrot ANAFI Ai is a cutting-edge 4G robotic UAV designed for advanced security and risk assessment tasks. Its autonomous photogrammetry and high-resolution 48MP camera, combined with robust 4G connectivity, ensure reliable operation in diverse environments. With a single click in the FreeFlight 3D map, it quickly maps security sites, while its AI optimises flight paths for efficiency. The precision of its geotagged 48MP images, aided by advanced sensors, allows for highly accurate 3D reconstructions, essential for effective site mapping and risk analysis.

Solutions

Payloads

PAYLOAD

DJI
Zenmuse L3

Laser
1535 nm Class 1
(Max 100 W)

RGB Camera
Dual 100 MP
Micro 4/3

Maximum Range
950m (@10% reflectivity)

High Accuracy
Horizontal: 5cm
Vertical: 3cm

Sensor Type
LiDAR

IP Rating
IP54

Weight
1.6kg

Overview

The DJI Zenmuse L3 sets a new benchmark in aerial LiDAR and imaging performance, combining cutting-edge precision with robust versatility for professional mapping, surveying, and inspection. Featuring a 1535nm Class 1 laser, it delivers exceptional range and accuracy — achieving 2–4 cm precision even in challenging environments. The integrated dual 100 MP Micro 4/3 camera system captures ultra-high-resolution imagery with outstanding low-light capability and a wide 107° FOV, enabling true-to-life visualisation alongside dense, high-fidelity point clouds. Built to endure real-world conditions, the L3 operates from –25 °C to +55 °C, is IP54-rated, and designed for seamless deployment on the Matrice 350 RTK platform. Whether mapping vast terrains or conducting complex infrastructure surveys, the Zenmuse L3 redefines efficiency, clarity, and reliability in aerial data capture.

PAYLOAD

DJI
Zenmuse P1

RGB Camera
45MP Full Frame
Sensor

Mechanical Shutter
Mechanical Shutter Speed:
1/2000*-1s
Electronic Shutter Speed:
1/8000-1s

Dynamic Aperture
Aperture Range: f/2.8-f/16

Stabilised Gimbal
3-axis (tilt, roll, pan)

Sensor Type
Photogrammetry

IP Rating
IP4X

Weight
800g

Overview

The DJI Zenmuse P1 is designed for aerial photogrammetry and features a 45MP full-frame sensor, interchangeable lenses (24/35/50mm), and a 3-axis stabilised gimbal. It delivers 3cm horizontal and 5cm vertical accuracy without ground control points and can cover 3km² per flight. Its global mechanical shutter and onboard firmware ensure precise image capture. Compatible with the DJI Matrice 350 RTK, it's ideal for topographic mapping, advanced inspection, and detailed model creation, enhancing efficiency in large-area surveys and complex modelling tasks.

PAYLOAD

EMESENT
Hovermap ST-X

SLAM LiDAR Sensor
Up to 1,920,000pts/s Effective Point Cloud Rate LiDAR

Field of View
360° x 290°

Mapping Accuracy
General Environments: +/- 15mm
Internal Environments: +/- 10mm

Deployment
Drone, handheld, RTK backpack, vehicle, tether, ground robot

Sensor Type
LiDAR

IP Rating
IP65

Weight
1.57kg

Overview

The Emesent Hovermap ST-X is a high-end LiDAR scanner designed for autonomous mapping with a LiDAR range of up to 300 metres. It features advanced capabilities like a Multi-Return Mode, delivering up to 1,920,000 points per second for dense and accurate data collection. This model is versatile, suitable for drone, handheld, or vehicle-mounted applications, and is equipped with an IP65 rating for operation in challenging environments. The ST-X is ideal for detailed mapping in sectors like mining, engineering, and forestry, providing survey-grade accuracy and comprehensive insights.

PAYLOAD

Phase One
P3 UAV Camera

Laser Range Finder
90m

IP53 Rated

Lenses
35mm, 80mm, 80mm AF, 150mm AF

Shutter Speed Max
1/2500 (sec)

Sensor Type
Photogrammetry

IP Rating
53 Rated

Weight
577g

Overview

The Phase One P3 is a high-end UAV camera payload designed for surveying and construction inspections where image quality and precision are critical. It features a medium-format 100 MP sensor that is significantly larger than standard full-frame cameras, delivering ultra-high-resolution images with excellent dynamic range. The system supports interchangeable lenses, including options that allow for wide-area coverage or detailed imaging from a greater distance, which improves mission efficiency and safety by reducing the need to fly close to structures. It offers smart focus and laser-triggered shutter capabilities to ensure sharp images even in challenging conditions. Compatible with major drone platforms and equipped with weather protection and 3-axis stabilization, the Phase One P3 provides reliable, detailed aerial data capture that speeds up inspections and improves the accuracy of surveying and construction workflows.