Aerial surveys and inspection for the property, rail and infrastructure markets using Unmanned Aerial Vehicles (UAVs)
Why Walk When You Can Fly?

**Plowman Craven** is continuing to push boundaries through a dedicated UAV division that uses the latest drone technology to provide high-accuracy surveying and inspection services to the property, rail and infrastructure markets.

Whether it’s a busy stretch of live railway, the roof of an historic building or an entire property portfolio, our highly-trained teams safely capture ultra high-resolution imagery and survey-grade data to a sub-5mm accuracy level that is unmatched in the industry – all in a fraction of the time taken by traditional methods.

Why **Plowman Craven**?

With more than 50 years’ surveying experience and a commitment to innovation, our expertise is unmatched.

Our investment in pilot training and the very latest drone technology is underpinned by robust survey principles and a comprehensive understanding of photogrammetry. This enables us to provide enhanced geospatial data that can be seamlessly integrated into existing workflows throughout a project lifecycle.

With enhanced permissions from the Civil Aviation Authority (CAA) to fly at low levels, even in congested areas – and being one of the few companies in the UK to have been awarded an Operational Safety Case (OSC) – Plowman Craven is able to deploy UAVs at even the most inaccessible, hazardous or large-scale sites.

**Key Benefits**

- Rapid data capture
- Survey-grade accuracy
- Inaccessible locations
- Improved safety
- Less manpower
- More cost-effective
- More & better data capture
- Wide range of deliverables
Why use UAVs?
They are much quicker, safer and more efficient for collecting large amounts of data or for areas that are inaccessible such as rooftops or railways. Using UAVs is also much more cost-effective for clients and produces a greater depth of information, such as high-resolution photography. Crucially, the data produced achieves an accuracy that is comparable to traditional laser scanning.

How is the data produced?
We use hundreds of overlapping, high-resolution photographs as a basis for creating a 3D point cloud rather than a laser scanner - this is called photogrammetry. The data then feeds into BIM workflows, enabling the production of 3D models and traditional CAD survey drawings. Before we fly we install control points on the ground to enable absolute geospatial accuracy.

Why is survey knowledge important?
It’s not easy to produce survey-grade data that is comparable or even superior to traditional laser scanning using photogrammetry, so using an established surveying company that understands the fundamentals of capturing, controlling and processing data is crucial. Many companies fly UAVs but very few can match the accuracy we’re able to produce.

What sort of preparation is needed?
Before we’re even on site we plan meticulously, looking at things like weather, airspace, the hazards and the potential risks to people or property. When we’re there, we’re looking for suitable take-off and landing locations as well as possible sources of interference such as GPS blocking from buildings, magnetic interference and wind turbulence in and around buildings. Of course, very detailed equipment checks are always conducted before every flight. There’s a lot to consider so our training and procedures are vital.
Property & Construction

The use of UAVs is now common-place in the property and construction markets where there are a wide range of applications for this exciting new technology.

Our UAV property and construction survey services cover everything from listed buildings and Central London offices to historic Universities and residential housing estates.

Recent projects include:

- Smithfield Poultry Market
- The All England Lawn Tennis Club (Wimbledon)
- Finsbury Square
- Clapham Park
- Royal Brompton Hospital
- Houses of Parliament

For property surveys we use the Falcon 8, made by Intel. Universally respected, it’s a lightweight, manoeuvrable octocopter (eight motors) that offers a raft of excellent safety features. A 36-megapixel Sony A7-R digital SLR with a 35mm lens enables us to provide survey data to a very high accuracy level.
Surveying the iconic Poultry Market at London’s Smithfield presented a significant challenge, with a requirement from the City of London Corporation to scan and model the entire building, including the iconic domed roof.

Our UAV team was deployed to the site and was able to survey the roof, canopies and all connected structures in 12 ten-minute flights that captured more than 500 high-resolution images. The UAV survey delivered geospatial data of the external structures along with interactive panoramic imagery of the roof that enabled a full condition survey to be supplied. All the data collected was then seamlessly integrated with the internal laser scans and 360° photography to create the required client deliverables.

**Deliverables**

- High-resolution imagery
- Orthophoto
- 3D point cloud
- Building Information Modelling (BIM)
- TruView
- Condition survey
With our new Vogel R3D, we have created a revolutionary system that enables the comprehensive surveying of the entire rail environment without the need for possessions, line blocks or people on the tracks.

Hailed as a “game-changer” by Network Rail, Vogel R3D delivers an incredible sub-5mm accuracy that meets Network Rail’s Band 1 accuracy requirements - the only drone-based survey system in the world able to do so.

Vogel R3D is also perfectly suited to infrastructure surveying where access is difficult, including bridges, viaducts, highways, waterways, ports, oil rigs, power stations and wind turbines.

Malcolm Donald, Director, Plowman Craven

Our unique Vogel R3D system provides an unprecedented level of accuracy. Vogel R3D is made up of an Altura Zenith drone platform, a 100-megapixel camera and a bespoke software and workflow process that enables the extraction of high-accuracy survey data.

“The Vogel R3D system really does represent a step change in the surveying of the rail environment. Not only does it massively reduce risk, cost and timeframes compared to traditional surveying methods, but the data accuracy is also superior to laser-scanning systems, making Vogel R3D a very attractive proposition with a wide range of applications. It can also be rapidly deployed on any infrastructure project that requires remotely-captured, engineering-grade data.”

Malcolm Donald, Director, Plowman Craven
Why use Vogel R3D?

Able to cover even the busiest and most inaccessible areas of the rail network from a working height of 25m, Vogel R3D captures track condition and measurement data from a position of safety even during traffic hours, making it perfect for track alignment and topographical surveys at all GRIP stages.

**Tangible Benefits**

- Less Risk - removes the need to physically access the track
- Less Cost – reduces the expense of possessions and line blocks
- Less Time – shortens programmes as data capture is significantly faster
- More Speed – rapid mobilisation means no waiting for next available possession
- More Value – high definition photography supplements current survey deliverables
- More Accuracy – proven to deliver sub-5mm accuracy

**Enhanced Deliverables**

- Track alignments for P-way design
- Topographical surveys
- 3D point clouds
- Building Information Models (BIM)
- Orthophotos
- High-resolution imagery for asset inspection
- Site visualisations & TruView

“The application of the Vogel R3D system is a real game-changer for Network Rail and helps us to satisfy many of our survey requirements in a safe manner without the cost implications or potential programme delays associated with multiple possessions.”

Chris Preston, Senior Engineer, Network Rail
Planning & Permissions

Plowman Craven takes UAV flying very seriously, conducting all projects in strict observation of all required safety standards.

Pre-Flight Preparation

**NATS** – National Air Traffic Service – we always contact before flying to alert them to our presence

**NOTAM** – Notice to Airmen – an alert issued to the CAA alerting other air users to our activities

**RAMS** – Risk Assessment Method Statements to ensure ground and air space is safe to operate in

Key Information

**PFAW** – Permission for Aerial Work awarded by Civil Aviation Authority (CAA) – Licence No. 2703

**OSC** – Operational Safety Case – Enhanced permissions awarded to us by the CAA that enable us to fly lower than other survey companies

**Data Security** - The only survey company in the sector to be awarded the ISO27001 certification by the BSI. The standard covers the provision of data management and security

Pilot Expertise

All our pilots have completed external training and obtained their Remote Pilot Licence from a CAA-approved training provider. Pilots also complete our own internal training programme that covers proficiency, emergency handling, and ground support to ensure the utmost competency. The programme observes the most stringent health and safety standards, beyond those specified by the CAA.

Safety First

All pilots hold an EASA Class 2 medical certificate, in line with standard aviation practice for commercial airlines. At least one member of every project team will have completed St John Ambulance Emergency First Aid at Work training. Plowman Craven operates with an absolute minimum of two personnel on site – one of whom is responsible for ensuring that the public and nearby properties are not put at any risk.

Equipment Reliability

Plowman Craven operates its fleet of aircraft in the same manner that a commercial charter airline would, with full maintenance schedules, procedures and checklists. All of our drones boast industry-leading safety features including triple-redundant autopilots, multiple rotors for redundancy, dual communications links, emergency return-to-home and blocking against electromagnetic and RF interference.

For more information:

**Plowman Craven Head Office:**
Plowman Craven House, Lea Business Park, Lower Luton Road, Harpenden, Hertfordshire AL5 5EQ
Tel: +44 (0)1582 765566
Email: uav@plowmancraven.co.uk

www.plowmancraven.co.uk