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Asset management, repair and maintenance enabled by drones

Increasing safety and efficiency, whilst providing significant cost savings are key drivers for the adoption of drones across a spectrum of built assets and infrastructure.

Benefits

- External condition surveys with improved accuracy that are safer, faster and cheaper.
- Improved repairs diagnosis, repair assessments and ongoing monitoring.
- Automating compliance requirements to reduce errors and manage risk more effectively.
- Real time access to data enables collaboration between remote and disparate teams.
- Design smart renovation, maintenance and investment plans.
- Contribute to Net Zero solutions through identifying remedial thermal solutions.
- Predictive analytics of building performance - more focussed maintenance spend.

Impact

Economic



Social



Why does this matter?

A vast spend is committed to asset management, and maintenance, with a lot focused on building fabric and integrity, especially roofs. In social housing alone, more than £6.3bn annually is spent on upkeep across the UK. Add to that the demands of maintenance and repairs of government facilities, bridges and built infrastructure, and there is a compelling need to find efficient solutions that are safer and faster, saving both money and time.

Why drones?

Drones are transforming the way that buildings and infrastructure assets are inspected. Owners of place and property portfolios can harness drone services to drive safety, productivity and efficiency whilst also improving resident and service user satisfaction. According to independent research, costs for inspection type activities may fall by around 34%.

Drones enable assets, including those requiring access to difficult to reach places, such as buildings at height and enclosed spaces, to be inspected quicker and cheaper enabling preventive maintenance regimes. Studies have found that preventive maintenance saves around 12-18% compared to reactive maintenance. Organisations responsible for a portfolio of assets in any sector could save time and money on inspections, make long-term savings through planned preventive maintenance (PPM), minimise working at height risks, and reduce disruption for residents and service users by using drones.

Requirements

About drone inspection

The use of drones allows for a safer, faster and cheaper building inspection which can deliver a range of benefits compared to the business-as-usual approach. They can also be flown over properties of all sizes to: inspect dimensions, highlight areas of damage, and take high-quality pictures. The data collected by drones can be used to inform the design process and provide invaluable information to allow for 3D images, digital twins and for estimating repair costs where needed.



Action Plan

What needs to be done to make this happen?

Technology → → → → → Industry

Sensors and advanced data modelling, together with imaging and calculation methodologies are fast evolving. The software and hardware (drone platforms) continue to develop with smaller drones, longer lasting power sources, and utilisation of tethered drones for direct data transfer to a ground-based asset. Together with remote signalling, dependent upon communications

infrastructure, these all point to greater efficiencies and sophistication. Importantly this supports the continued drive to data accuracy, including fixed and moving images, thermal sensors and other forms of inspection including testing for gas emissions, land movement and other important factors affecting repairs and maintenance of assets.

Automation → → → Operators and Industry

Extended autonomous functionality will be a staple in the professional drone world, but it will come in steps. In future, Beyond Visual Line of Sight (BVLOS) functionality will be approved within defined perimeters. By allowing BVLOS operation, drone pilots will be permitted to remotely man their drones in secluded areas from a digital screen. Drones will

be able to cover more ground in shorter times, and the entire operation will be overseen from a distance, keeping inspectors out of harm's way. Increased data integrity enabled through Wi-Fi/internet and associated 5G/6G infrastructure will eventually enable fully remote operations removing the need for personnel on-site.

Regulation → Government, Regulator and Industry

Professionalism within the industry is a key factor for growth, however, research makes a key assumption that the regulatory environment poses no barrier to the operation of drones across a range of use cases. Regulation is an evolving area, and industry bodies together with Government are developing a framework that provide safeguards, yet do not stifle innovation and adoption. An independent report by The Regulatory Horizons Council has recommended a review which explicitly seeks to

change the appraisal of the requisite clearances required for drone operations, to speed it up via automation so that the CAA (Civil Aviation Authority) can focus their manual efforts on complex cases. To become commercially viable, logging individual flights with regulators will soon need to give way to a more automated approvals process, e.g., along pre-approved routes. This is particularly desirable for repeated operations of a very similar nature where only a small change has occurred.

Related use cases

Renfrewshire Council owns roughly 12,000 properties in their social housing portfolio, consisting of 2-5 story low rise accommodations and 14 high rise towers. Until 2016, they had been using mobile elevated working platforms and scaffolding to carry out façade and roof inspections, but now they regularly use drones when possible. Under their previous inspection regime, roof tiles with a 30-year life-span were replaced after their advertised lifespan. Since using drones to inspect their properties, the council has been able to assess the health of roof structures more effectively and decide whether to maintain them for an additional 2, 5 or 10 years. Using traditional methods, the data gathering process would have been too slow for this approach to be viable. Last year alone, this methodology saved the council £4m+ and allowed an entire program of inspections to be carried out in under 2 months (as opposed to multiple years for a similar scope using traditional methods).

Future use cases

The next phase of advancement will include development of smarter drones with the ability to recognise problems themselves through integration with advanced computer vision and machine learning technologies. Drones could then advance from problem recognition, to problem-solving with these same technology integrations, in addition to drone add-ons such as 3D printers and other technologies. These will allow drones to perform small tasks autonomously, such as cleaning and minor fixes, while major interventions will continue to be handled by inspection professionals. In turn, we will see the development of 'drones that do', whereby a drone will inspect and fulfil a function, such as cleaning, or simple repairs and maintenance tasks, through to painting and spot welding.

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