



THE RISE OF UAVs

Richard Hjelmberg examines the part that unmanned aerial vehicles now play in the emergency and security services

Vertical Take-Off and Landing (VTOL) unmanned aerial vehicles (UAVs) are increasing in popularity across both military and civilian domains as organisations realise the benefits they can bring to a mission. A growing interest in their application is within the 'blue-light' forces – such as emergency services and security companies. In the UK, at least 40 police forces and two thirds of the UK's fire services are now using UAVs, with the platforms deployed in various emergency scenarios including search and rescue, traffic collisions and flood relief. Elsewhere in Europe, the Croatian Mountain Rescue Service has been using UAV technology for the past

six years, while autonomous drones are now delivering defibrillators in Sweden.

With advantages including the ability to hover and perform agile manoeuvring in tight spaces, the capacity to deploy extensive payloads and boasting a small logistical footprint, UAVs enable users to gather data efficiently and cost effectively.

In an emergency scenario, speed can be the difference between life and death. UAVs are able to reach a destination significantly faster than manned crews and can access dangerous environments without exposing the team to the associated hazards – a particular advantage for those working in emergency response settings. Fixed-wing UAVs tend to boast superior endurance over longer distances, though

At least 40 police forces and two thirds of the UK's fire services are now using UAVs

rotary wing platforms are improving in this area and offer enhanced agility.

Today, we are seeing increased popularity of Rotary UAV platforms in the emergency services sectors due to consistently evolving technology. Take, for example, the heavy fuel engine. From a maritime perspective, it is critical that the UAV runs on heavy fuels as gasoline is not permitted onboard a navy vessel due to its combustibility. Most fixed-wing aircrafts are powered by conventional petrol engines and thus cannot be deployed from a seaborne asset. For those working in maritime-based emergency or security sectors, such as search and rescue or infrastructure monitoring, this leaves a gap in a mission plan that can be filled by Rotary UAVs.

Kerosene-based heavy fuel is one of the primary fuels used in the maritime domain and is desirable due to its strong performance, lower volatility and the fact it can be stored for long periods of time without risk of degradation. Most importantly, heavy fuels reduce the danger of fires on a ship or base, which is a must for naval operators. The kerosene-based JP8 is one of the primary fuels used in the maritime domain and supports NATO's one-fuel policy.

For maritime, and increasingly land-based organisations, the smaller logistical footprint of a VTOL UAV is becoming a key benefit. Being able to not only house the platform in a smaller area, but also easily maintain and service the air vehicle, are benefits that enable blue light and security services to take advantage of quick turn around times during operations – a must when time is of the essence.

Overall, the importance of a UAV is in its ability to monitor and capture data from its mission. To do this the sensor suite integrated with the platform is a critical consideration. The choice of sensor depends on the mission being carried out. For example, Electro-Optical/Infrared (EO/IR) gimbals provide advanced wide-area situational awareness and intelligence gathering through collection, identification, categorisation and geo-location of static and moving objects of interest. It provides real-time, high-definition video to commanders and decision makers for uninterrupted surveillance of borders, urban areas, activity and events both by day and night. Optical radars, meanwhile, are an airborne persistent wide area maritime search system that autonomously detects objects on the ocean surface and provides the operator with a detailed image of items that other search methods often miss.

Further sensors available today include Synthetic Aperture Radars (SAR), Electronic Warfare, radar, radio/data delays and gas/particle sensors to name a few. For UAV manufacturers, the aim is to be able to carry multiple payloads, therefore providing the ability for users to monitor and assess more than one item or activity at a time. In the future, this will be a must as organisations looking to advance their use of medium-sized UAVs.

A key area for UAVs in the emergency services space is in search-and-rescue missions. In these time-pressured scenarios there is often too much ground for crews to cover on foot or at sea. The solution comes in the form of UAVs – offering an 'eye in the sky' tool that, when deployed with infrared cameras, can rapidly shift the course of a search-and-rescue mission. In July 2021, an 82-year-old man missing in Wales for 18 hours was located with the help of a UAV team able to provide a wide area assessment to work in parallel with the manned crew on the ground. The North Wales Police drone unit was only launched in April 2021 and has already been deployed more than 250 times, showcasing its value in this sector.

There is arguably no greater risk associated with emergency response than in firefighting. A recent study in Saudi Arabia revealed that pairing ground-based sensors with UAVs could give firefighters a critical advantage when tackling wildfires. Traditionally, wildfire detection is performed mainly by satellite imaging and remote cameras, but these technologies can be impeded by cloudy weather and fires can grow to a considerable size before they are spotted. With the recent significant global increase in wildfire frequency and severity, technologies that can aid wildfire management are in high demand. Researchers discovered that pairing Internet of things sensors (to monitor for the first signs of smoke and heat) with UAV platforms greatly reduces the time taken to detect fires compared with satellite imaging. Even a slight decrease in detection time offers a significant advantage in terms of reducing the damage from wildfires.

Powerline inspection is an expensive and time-consuming business. Checking for damage, points of failure or even factors such as birds regularly landing on them or vegetation growth has always been a task that had to be completed manually. A team of people are deployed daily with the expectation of covering tens of miles per day, climbing poles, inspecting segments of a powerline. For smaller utilities companies this might be sufficient, but for larger organisations it just isn't practical, both in terms of time taken and cost.

COVID RULE CHANGES ALLOWED POLICE TO FLY AT HIGHER ALTITUDES AND CLOSER TO THE PUBLIC

To tackle this issue, utilities companies are reviewing how innovative technologies such as UAVs are able to help them complete such a vital task in a more cost-effective, time-efficient way. UAVs enable security operatives to monitor any suspicious activities as well as check the status of the condition of large swathes of powerlines without exposing crew to the associated hazards or the tedium of ongoing inspections. Furthermore, UAVs can share data via the cloud in real-time to crews in another location, totally separate from the inspection itself.

With numerous application areas, many will wonder what has delayed widespread UAV deployment in the blue-light services. One major obstacle is regulations: in many countries, it is illegal to fly over populated areas, though there are exceptions to this in some areas where they can override EU legislation for internal operations.

There are projects ongoing to assess how UAV platforms can be safely integrated into controlled manned airspace. The ECARO project is a great example – successfully demonstrating that the European GNSS systems (EGNOS and Galileo), in addition to GPS, are capable of ensuring UAVs can perform safe satellite-based approach procedures, a capability required to include and integrate UAVs in controlled airspace. As part of the project, UMS Skeldar participated in three weeks of trials at Grottaglie Airport in Italy, deploying a crew, remote pilot station and the V-150 platform. The flight profile followed the satellite approach procedure designed by ENAV in accordance with new EASA regulations.

During the COVID-19 lockdown, restrictions on where police can fly UAVs in the UK were eased as the

Civil Aviation Authority (CAA) issued new guidelines, which allowed officers to fly at a higher altitude and closer to the public than normal. Specifically, officers could fly UAVs at an altitude of up to 500m rather than the normal limit of 400m, while UAVs under 2kg could be flown within 10m of people and objects or 20m for heavier platforms (the usual minimum distance is 50m).

UAVS ENABLE SECURITY OPERATIVES TO SAFELY MONITOR ANY SUSPICIOUS ACTIVITIES

Police forces have always had the ability to fly UAVs outside the limits of the CAA’s rules, but the move by the regulator provided a blanket exemption to help tackle COVID. The document outlining the new flight limits stated: “This exemption is only applicable for use in the support of the police response in enforcing the Government restrictions placed on the public as a result of the COVID-19 pandemic.”

Interestingly, only one force – Derbyshire – made use of the relaxed rules; Derbyshire was also the force that received the largest number of complaints about its use

of UAVs, highlighting public privacy concerns. As the UK government opens up UK airspace to large ‘beyond visual line of sight’ UAVs for both state and commercial use, it is likely that both the public and private security sector will quickly adopt such technology for surveillance purposes. This will inevitably spark a debate around what constitutes necessary and appropriate use of UAV technology. Open stakeholder engagement will be required here to reach an outcome that both protects public privacy while also capitalising on the advantages offered by UAVs in the emergency response and security sectors.

BLUE-LIGHT SERVICES

For blue-light services, small advantages make a big difference between a successful and unsuccessful mission. Increasingly, crews are deploying UAV platforms to replace or compliment traditional methods and with benefits including increased safety, reduced risk and enhanced efficiency, there is no doubt this trend will continue.

Technological advancements across both engines and sensors are accelerating UAVs from a nice-to-have to a must-have tool in the armoury of police forces, firefighters and security teams alike. We already have a lot of infrastructure on the ground, but perhaps now is the time to benefit from putting greater sensing power in the air instead ●

Richard Hjelmberg

(Vice President Campaigns at UMS Skeldar) has over 30 years of business development and sales experience within the aviation industry. Within UMS Skeldar his primary role is to lead and structure major campaigns.

Fixed-wing UAVs boast superior endurance, but rotary wings are catching up and offer enhanced agility



Picture credit: UMS Skeldar