# TAKE TO THE SKIES

**David Willems** *reports on how drones are being used to innovate supply chain security*

Cargo transportation is as old as time. Throughout the centuries we have seen a wide range of freight transportation come and go, ranging from horse-drawn wagons to aeroplanes and helicopters. For many years, goods travelled to their destinations using horse drawn wagons, which were very slow and often dangerous for the people driving them. Later, with the introduction of the railway system, freight could be delivered to destinations further away in a faster, safer way. However, there were still limitations as railways only covered a certain part of the country, and different modes of transport were still required to ensure the freight reached its destination. Security issues were also a major concern, with the possibility for either theft or other loss along the journey a frequent occurrence. Next came the road transport revolution, with cars, vans and trucks transporting goods from depot to depot or point to point.

Internationally, before the introduction of the steamboat in the early 19th century, many types of goods were moved by sailing boats. A highly successful industry for a number of centuries, more modern innovations eventually took over due to their vulnerability from such things as adverse weather. The invention of the steamboat sped up the delivery of goods, with more modern inventions including ships transporting heavy machinery and other cargo.

In the 20th century along came the airplane, which brought with it a wider set of options for freight transportation. Over the years, new innovations led to the development of the jet, alongside larger aircraft, which could transport everything from people to large animals, commercial goods such as furniture, food and machinery. Delivering cargo by airplanes and jets proved to be both fast and efficient, and for businesses increased productivity significantly. However, the cost of delivering goods by air was generally expensive, which is why cargo delivery by sea remains popular to this day.

For smaller deliveries, the 20th century also brought with it the invention of helicopters. These offer a convenient, timely method for delivering urgent freight to destinations including islands, offshore oilrigs, mountain resorts, remote construction sites and other such smaller locations.

However, as cargo deliveries have become more sophisticated over time, so has the security implications alongside them. Supply chain security has become an important priority for all organisations. Every business needs to develop its practices for the security of their goods to prevent future losses.

Today, cargo theft and cyber security issues are multi-billion-dollar problems across the world. For example, air cargo is one of the most vulnerable elements in the aviation network. There have been numerous stories involving air cargo related incidents, such as drugs trafficking at London's Heathrow Airport, that have increased the spotlight on the global risk air cargo represents.

## RISING COSTS

This has meant that cargo operators have found themselves under intense pressure from regulators to increase their security protocols in line with more stringent standards. Not only is this a costly exercise, it also takes significant time and resources to meet continually updating standards. The knock-on effect of this is that many cargo operators have become less efficient and more expensive to use.

In the military and maritime domains, unmanned aerial vehicles (UAVs) are increasing in popularity as organisations realise the benefits they can bring, from the use of heavy fuels to reduced logistical footprints and ease of maintenance. However, in the civilian space, many industries are still largely unaware of the applications UAVs can perform.

This is changing. In 2019 alone, the civil UAV market had a global volume of about $5.5-billion, and the market for production and services applications is forecasted to grow at around 11 percent per annum over the next five to six years, largely driven by the infrastructure sector.

Today, the civil UAV market can largely be split into three categories: infrastructure inspection and maintenance, environment inspection and maintenance, and transportation and leisure. If we take the energy sector as a prime illustration of how UAVs are assisting, we can immediately see why they are increasing in use. A highly complex sector, the oil and gas industry incorporates asset management, environmental compliance and safety, which all must be addressed and guaranteed. For example, many organisations have invested heavily in deploying large oil pipeline infrastructure across an expansive geographic network, spanning countries and continents. This creates a need for activities such as oil and gas exploration, inspection and monitoring of pipelines. Pipelines must be routinely checked to not only ensure their structural integrity for continuing safe operations, but also to monitor for intruders and other potential trespassers.

The same can be said for oil fields out at sea. Traditionally, inspections have been completed by deploying teams of personnel. However, these types of examinations often entail high-risk situations and very lengthy journeys requiring each team member to spend a long time in the field. In addition, they can be very expensive; for example, aerial inspection

> ## USING UAVS ENSURES DATA CAN BE SHARED VIA THE CLOUD IN REAL-TIME TO ANOTHER LOCATION

of pipelines using manned helicopters costs usually north of $3,000 for one hour.

UAVs have the advantage of enabling oil and gas operatives to monitor any suspicious activities as well as check the status of the condition of hard-to-reach oil fields or cross border pipelines. Inspecting and maintaining oil pipelines and platforms is a perilous task: many are remote and in extremely harsh environments. Rig inspections carried out by rope-access technicians can take up to eight weeks and involve shutting down production.

By capitalising on their endurance, using UAVs in these environments means it is possible to access these areas with relative ease, but without exposing crew to the associated hazards. This removes risk to employee safety and consequently reduces medical expenses and lost work hours due to injury.

As well as the associated dangers, the remote location of oil and gas work also presents a challenge in gathering and sharing data. Having manned crews run inspections and repairs means a delay between data recording and analysis. In contrast, using UAVs ensures data can be shared via the cloud in real-time to crews in another location, totally separate from the inspection itself.

Not only do UAVs gather information more efficiently than humans, the digital data enables operatives to make better decisions based on more accurate data. Once a potential hazard has been identified, it can be addressed in a far shorter time than the manned alternative. This helps to identify issues earlier and reduce downtime, which is vital for organisations in charge of safeguarding critical infrastructure.

Today, oil and gas organisations are beginning to deploy UAVs as they move towards non-conventional sources and more challenging environments. This is due to the requirement to ensure round-the-clock vigilance, a priority in any strategic asset protection plan.



**Vertical Take-Off and Landing remotely piloted aircraft systems boast a reduced logistical footprint to save space**

Picture credit: UMS Skeldar

Overall, the key benefits include: providing a quick overview and evaluation of difficult to reach areas; preventive maintenance planning and optimised production keeping costs on the low side; access to locations that pose health, safety and environmental risk to personnel; real-time data transmission; fast on-site deployment of UAV platforms; authorised and qualified UAV-inspection personnel; and reduced downtime increases overall efficiency.

As you would expect, new applications for UAVs are consistently coming online, for example the supply of medical goods. For this industry, fast and reliable transportation of medical goods such as blood, vaccines, snake bite serum and other medical supplies can be the difference between life and death, especially in more rural areas. In some instances, medical goods can be ordered via mobile phones, with the UAV being launched within 10 minutes,

## AIR CARGO IS ONE OF THE MOST VULNERABLE ELEMENTS IN THE AVIATION NETWORK

providing a life-saving alternative to comparatively slower overland journeys.

Further innovations in this area are also being researched. Ship-to-shore UAV deliveries are being investigated, whereby medical supplies and water are delivered to those that require them during disaster situations. In this scenario, the UAV can be used to carry medical samples for emergency testing, flying them between an onshore medical relief camp and a test facility on a ship. With Vertical Take-Off and Landing (VTOL) remotely piloted aircraft systems (RPAS), it is possible to land vertically unlike fixed

wings, providing the added advantage of not only an efficient landing, but a reduced logistical footprint which also saves space.

The global healthcare community is continually looking for new ways to deliver medical supplies and protect their people. For example, in third-world countries, many villages are hard to reach by road and residents cannot travel to hospitals due to distance or remoteness. UAVs can provide the necessary medical supplies in a quick and efficient manner, saving more lives than is possible using more conventional transportation methods.

In addition, the COVID-19 pandemic has increased the need to review UAV technologies. Many trials have happened across the globe, with UAVs being used to deliver urgently needed medical supplies such as test kits and personal protective equipment. Through enabling more efficient delivery and quicker diagnoses, UAV usage is proving its worth over slower forms of transport such as road, rail or even sea.

The use of UAVs, especially VTOLs, will continue to increase, not only in the military and maritime sectors, but also across the civilian space as more organisations realise their benefits, especially in delivering cargo. With an ability to fly for longer than ever before, and in reaching hard-to-access areas, the future is almost endless in terms of what UAVs can achieve.

However, it is important to recognise that with increased usage will come the need for increased security. The standards and regulations surrounding UAVs are intensifying, which means that manufacturers are having to work harder to meet these. Due for release in the coming months, it will be important that these new regulations are met, not only for the security of the industry, but also to improve the quality of the UAVs being used. After all, like all of the forms of transport before them, UAVs will need to provide the quality service we all know is possible ●

**David Willems** is Global Director of Business Development and Strategy for UMS SKELDAR and has spent over 20 years working in the aviation Industry. He has been involved in the unmanned industry for seven years and currently serves on the Board of another Swiss technology integrator company providing security solutions using unmanned systems.

UAVs make it possible to access remote areas with ease