

Budgetary reductions to law enforcement agencies mean that OEMs must take steps to provide cost-effective EO/IR while maintaining the diverse capability operators require. *RH* explores how companies are meeting this challenge head on. **By Beth Stevenson**

An EO/IR camera is the mainstay of the sensor suite used in support of police missions. (Photo: Airborne Technologies)



Eyes down

Used in support of airborne law enforcement (ALE), a helicopter can provide an elevated watch as a scene beneath unfolds, supplying data to ground personnel in order to inform them of a perpetrator's movements.

As with most airborne surveillance platforms, an EO/IR camera is the mainstay of the sensor suite used in support of this application, and is found on all rotorcraft of this type.

However, law enforcement agencies the world over are experiencing budget cuts, and while the benefits of an airborne asset

such as a rotorcraft are apparent, they are often the victims of these economic measures, since operating a helicopter with a capability to provide advanced sensing comes at a cost.

Meeting demand

It is therefore a challenge for operators and decision-makers to maintain capability while balancing costs. 'The requirements are very high in the airborne market, but at the same time the budgets are decreasing,' Nir Bar-Natan, marketing director at Controp, told *RH*. 'There is a problem with

that, and one of the ways to overcome it is to go for a smaller payload.'

Controp provides the iSky family of payloads for the ALE market. It comes in a number of configurations, ranging from the iSky-20 model up to the -50HD.

Bar-Natan claimed that in order to meet the demands for more capability at a lower cost, there is a strong market for the company's iSky-20 and -20HD models, which come within more of its target markets' budgets.

It is not all about the EO/IR sensor itself, but also the mission/mapping system that

it is operated alongside. While there is a tendency for users to want augmented reality in their mapping capability, this also comes at a price, and there are less-expensive alternatives, Bar-Natan argued. 'There are some police forces still using regular maps, and not everybody needs augmented reality,' he said.

'I agree that it is a nice solution to have, by which you can see the streets and addresses, and everything is done on one real-time image, but it is very costly and not everybody can afford it. From our point of view, there is a tendency to go for smaller payloads like the iSky-20, which is the more cost-effective, and for the mission computer, to maybe go for simple systems like regular maps and not augmented reality.'

He added that integration with a search light is also a requirement of customers, using the EO/IR sensor to cue the light.

Capability overload?

While the -50HD model is closer technologically to the types of systems offered by FLIR Systems and L3 Wescam, Controp has acknowledged that this level of capability is not always necessary, and the segment of the market in which these competitive companies prevail can be inaccessible to non-US companies.

'It is not just about cost, but access to the market,' Bar-Natan said. 'When talking about the US, this is a challenging one because it is dominated by FLIR Systems and Wescam, and it is very hard to get into this market. You need good local support and integration companies to support customers. In the rest of the world it is easier because we have better access to the customer. Usually they have less budget, which is good for us as a company that provides cost-effective solutions, so it is easier for us to approach.'

Because of the nature of its target markets, the company offers EO/IR systems for its ALE customers mainly as a retrofit or upgrade offering. 'We have very good payloads, but [the operators] already have contracts with the other [EO/IR providers], so it is hard to approach them,' he explained. 'So, our market is retrofit or upgrades. With our systems we can approach the end user very

“ One would think that the technology proliferation would ease the operator workload, but in fact there are greater demands with a distributed system. ”

easily, and don't have to go through the manufacturer of the platform to convince them to take our system.'

He added that the challenge is to find a local integrator that can obtain licences to make modifications to the rotorcraft, including access to STCs and certifications required for the upgrades. 'I think that Asia-Pacific is the main market we should concentrate on because it is developing and has lots of needs,' Bar-Natan noted.

Controp announced in June 2017 that the Israel police force had selected the iSky-20HD and iSky-50HD payloads for its new fleet of Airbus Helicopters H125s and H145s. The company is in the process of introducing upgrades into the iSky-50, including an HD thermal camera and a short-wave IR (SWIR) capability, which could eventually be selected by the Israel police force.

SWIR is common in the land and maritime domains, Bar-Natan added, but the benefits are also starting to be realised in the air segment as well. 'We have an option in the iSky-50 to add a SWIR camera instead of the day spotter, and then in one

gimbal you have a thermal camera, day camera, and short-wave IR, which is most of the wavelengths required,' he said.

The SWIR camera is significant in size, so this is only applicable to the larger gimbal at present, whereas the HD thermal sensor – also only integrated into the larger sensor at first – will be rolled out to the rest of the family at a later stage.

Continuous view

Another provider aiming at a segment of the market in which budgets are tight is Trakka Systems, which launched the TC-300 payload in 2015 to complement its family of rotorcraft searchlights.

Trakka deliberately did not set out to compete with FLIR and L3 with the system, claiming instead to target a sweet spot in the market in terms of capability and price with its 300mm-diameter gimbal. 'We decided we could offer a disruptive system into the marketplace with an offering we subsequently launched called the TC-300,' Andrew Phillips, executive VP for global business development at the company, told *RH*. 'We went for a sweeter point in the market where we can offer users performance approaching that of the big systems but at half the price.'

Phillips said that a unique feature of the company's sensors is the continuous zoom capability, meaning the operator does not need to switch between different fields of view. 'For a law enforcement application, when switching between different fields of view while tracking a group of suspects, for example – which then decide to split in different directions – the operator often loses the target because they have to go out to the wide field of view as they split in different directions,' he explained. ▶

L3 offers its MX-series payloads for the ALE market. Pictured is an image via the MX-10 class. (Photo: L3 Wescam)



'Because it is not a smooth transition, there can be seconds where the image is interrupted and you can lose the target. So, our systems have continuous optical zoom, so you can zoom out continuously while maintaining a field of view.'

The TC-300 is currently undergoing qualification testing, which is expected to be complete by the end of the year, with a number of OEMs. 'It has just finished qualification and is going into production. It is at the beginning of its life cycle, so OEMs are evaluating it,' Phillips confirmed. 'We have long-term framework agreements with the big players such as Airbus, Leonardo [Helicopters] and so on for our searchlights, and the intention is to do the same with those guys for their camera systems. Some of the European ones are already evaluating the system to go onto their standard helicopter baseline.'

The system has been contracted for an undisclosed law enforcement rotorcraft customer, and deliveries are imminent, Phillips said. The TC-300 has also seen success on the fixed-wing Grob G120TP, for which deliveries have already been made.

Searchlight success

Another adaptation of the technology is the integration of a sensor on the searchlight. The concept was originally aimed at EMS operators that need searchlights to land at night, but who often cannot use them due to the possibility of blinding people on the ground.

'You can't always switch on the searchlight,' Phillips said. 'We decided that we'd fit an uncooled thermal imager plus a TV camera on top of the searchlight to give the pilots and crew better situational awareness. That capability is not a gimballed camera that will allow the operator to read a licence plate from far distances, but it does increase situational awareness. It also attracted a market segment that we hadn't anticipated for law enforcement, in the counter-terror response role.'



The MX-8 is a compact, multi-sensor, multi-spectral imaging system in a single LRU configuration. (Photo: L3 Wescam)

Rotorcraft that transport counter-terror forces to a scene often cannot carry large EO/IR gimbals, so the dual role of the camera on the searchlight can benefit the sensing capability of the aircraft.

'We are seeing good demand,' Phillips added. '[This is about] being able to offer the market a camera system that is very cost-effectively priced that you can buy on its own or as part of a system with a searchlight.'

Trakka also offers a low-cost mapping system that appeals to ALE operations, which Phillips said is 50% of the price of other similar capabilities. 'We are trying to provide a low-risk, seamless integration, so that for somebody who is budget-constrained and doesn't want the risk of integrating systems from three different manufacturers, we offer a very easy turnkey package.'

Honing the high end

At the higher end of the market sit systems from L3 Wescam, which is renowned for its EO/IR gimbal family.

L3 offers its MX-series payloads for the ALE market, specifically the MX-10 class that the company says matches the requirements of many operators in this field.

'This is due to the standard issues faced by aerial sensors: size, weight, performance and cost to meet the smaller budgets,' said Paul Jennison, VP of government sales and business development at the company.

'Since most ALE operations are serviced by the smaller rotary-wing and fixed-wing aircraft, these are critical to normal operations, whether normal patrol or covert missions.'

Jennison noted that the ALE market is benefitting from higher-resolution HD video in both the EO and IR segments of the spectrum, which allows operators to identify suspects hiding from ground officers.

He said that the integration of moving maps and data links have had the biggest impact on ALE operations in recent years, as while an EO/IR sensor alone is beneficial to an operation, the addition of moving maps increases the situational awareness provided to the operator 'exponentially'.

Wescam's EO/IR sensors can be cued to augmented reality in the moving maps, which can then be fed to ground operators/dispatchers for coordination with ground operations, Jennison said, adding that improved data links have increased this capability as well.

The technology offered for ALE missions is adaptable, with the MX-series also being used for fire-fighting, utility surveys and conservation use, as well as for military applications such as surveillance, homeland security and disaster response.

Jennison agreed that ALE operations are continually challenged by funding pressure and budget approvals, as expenditure tends to be small and focused on ground forces.

'Product cost is a major issue in the ALE market,' he noted. In response to this, the company recently launched the MX-8 system as a lower-cost alternative to the

According to Trakka, its sensors are unique, with their continuous zoom capability meaning that the operator does not need to switch between different fields of view. (Photo: Trakka Systems)



MX-10 and MX-15. 'Importantly, this product leverages the investment that Wescam has made in its larger sensors to bring a new level of capability to this cost-effective sensor class.'

There is also a move towards acquisition of lower-cost rotorcraft, Jennison added, which generates demand for lower-cost sensors, and was a significant driver in the development of the MX-8.

Wescam is continuing to improve its family of EO/IR sensors, he said, although the form factor of the series tends to remain the same. The MX-15 has been on the market since the late 1990s, while the MX-10 has been on the market since 2009, and both sensors have undergone improvements, but have maintained a certain level of commonality with previous iterations in their fit and form.

'That said, OEM and operator feedback is very important in guiding product improvements for emerging tactical airframes,' Jennison said. 'For example, Wescam's introduction of high-sensitivity

colour cameras, as well as its introduction of the advanced video tracker, were both based on requirements for improved performance from the customer base.'

A recent upgrade to the MX-10 introduced HD thermal imaging as well as high-sensitivity colour imagers that provide low-light capability without the need for a night vision camera. Providing a colour image at low light levels helps ALE operators identify the colour of a car at dusk, Jennison noted.

In addition, Wescam has invested in the internal processing power of the sensors, which has allowed it to offer capabilities such as moving target indication into the sensor. 'This significantly reduces the cost of acquiring this function, as well as reducing the overall size, weight, and integration complexity of the installation,' he said.

'We have simultaneously invested in embedded capabilities, one of which is our advanced Autotracker. It is easy to engage and very robust. It eases operator workload

when tracking objects/targets for long periods of time.'

Compact but capable

The other big player in the EO/IR market is FLIR Systems, which has identified a need for more compact systems for the ALE application.

However, Adam DeAngelis, director of FLIR's Government & Defense Business Unit, pointed out that sensors cannot be compact to the detriment of performance, since the payloads still have to offer the range required from the sensor.

DeAngelis noted that FLIR's most suitable offering meeting these criteria is the Star SAFIRE 380-HDc payload, which has been adopted by the ALE marketplace, particularly by those operators that are seeing budget and SWaP constraints. FLIR claims that the 380-HDc provides in excess of 75% of the range performance of larger systems, 'easily outclassing other compact systems'.

'We are also seeing increased demand for ease of use,' DeAngelis told *RH*. ▶

'One would think that the technology proliferation would ease the operator workload, but in fact there are greater demands with a distributed system. Since the EO/IR sensor is at the centre of the universe, so to speak, there are expectations from customers for our systems to be easy to use.'

DeAngelis noted that Australia, Europe and North America are the key driving markets at a macro level for ALE, although he pointed to an increased interest by fire-fighting agencies that are recognising the benefits of an integrated EO/IR capability.

He added that FLIR's products are designed to work either standalone or integrated with other equipment on the aircraft, to include a downlink that can be provided to allow remote command stations on the ground to control the EO/IR system while it is in flight.

R&D, in which the company invested \$43 million in Q2 2017, is integral to keeping the company's ALE offering relevant. 'This investment is critical to our business growth and differentiation,' DeAngelis noted. 'While we cannot provide specifics, we continually leverage our successful product pedigree, while balancing [that] with actual and evolving market needs. Our R&D investments play a critical role in new payload development too,' he added.

Quite unmanned?

While it is often a given that rotorcraft will be used for ALE surveillance, there are certain challenges to the market that payload providers are starting to identify. A cheaper and sometimes safer alternative to using rotorcraft is the deployment of UAVs, which can carry a similar sensor but on a smaller platform.

'Airborne is also divided into helicopters and UAVs, and we supply payloads for that as well,' Bar-Natan said. 'The family of [Controp] Stamp payloads start from 300g up to 6kg, and the tendency nowadays is to move, even in law enforcement, from very expensive helicopters to drones and UAVs.'

He claimed that this is the biggest shift in the ALE market, as operators see the benefits of utilising an unmanned alternative. 'In the future, I think we will see this more and more because, especially in law enforcement, the use of the helicopters



An H135 operated by the Saxony Police, with the FLIR Systems SAFIRE 380-HDc. (Photo: FLIR Systems)

is an eye in the sky for the ground forces, and the same application can be carried out with a drone that costs less than a helicopter, so why not use it if it has the same capabilities?'

Bar-Natan noted that this trend is in addition to a requirement from the operators for even more capability. 'The requirements for airborne applications and law enforcement are really high.

'In the past there was a very simple and regular map system, but now everything is augmented reality.'

Furthermore, Jennison argued that fixed-wing fleets are also challenging the role of rotorcraft in ALE operations. 'There seems to be a trend to add fixed-wing assets to certain ALE fleets. The normal ALE missions are being expanded to include more surveillance and covert operations to their normal patrol missions,' he said. As a result, fixed-wing aircraft are being added because they can operate more covertly than most rotary-wing aircraft.

However, he added that many ALE agencies are now also providing coverage of large public events at stadiums using fixed-wing helicopters. For example, the Californian Highway Patrol that provides surveillance services for National Football League events in San Francisco.

Despite some movement away from the traditional use of rotorcraft in support of ALE, it continually appears to be the mainstay of such operations. 'The rotary-wing aircraft mission remains for their ability to provide a quick reaction to events that cannot be done by fixed-wing aircraft,' Jennison noted. Such platforms have been used in support of this role for many years, and integration of EO/IR payloads onto rotorcraft is commonplace, with the technology ideally suited to it.

Be it lower cost but still relatively capable technology such as that offered by the likes of Controp and Trakka, or the top-end systems offered by FLIR and Wescam, EO/IR sensors are available to all types of ALE operator, irrespective of the type of helicopter they operate.

However, manufacturers have acknowledged that budgets are being tightened on both ends of the spectrum, meaning they are now having to try and offer the same capability that is expected from these operators but in a more affordable package.

This helps ALE operators stay at the top of their game, providing surveillance of an area of interest and tracking perpetrators from the privileged aerial position unavailable to their ground counterparts. ■