Picture credit: Maverick Aviation Ltd.

LIFT OFF!

Antony Quinn *explores the impact intelligent, hands-free jetpack technology will have on the security sector.*

Jetpacks allow short-range operational or logistical tasks of under five miles to be completed at significantly lower cost than helicopters

The jetpack age has arrived for the security industry – 60 years since the world's first rocket pack, the Bell Aerosystems Rocket Belt, had its maiden flight. Strapping jet engines to yourself and heading up into the sky was preserved for science fiction until very recently. It's only over the last few years that these flight systems have matured from being a James Bond-style gimmick to finally being taken seriously as a future mode of transport in critical situations. The security sector now promises to be one of the biggest customers for this kind of technology and uses are emerging all the time.

The security industry has made quick use of drone technology, but there remains a need for manned missions that go beyond simple observation. It's the sort of capability that you don't miss until you've come to rely on it. Drones and jetpacks will likely end up complementing each other in an operational environment. Drones are cheap, agile and have endurance, but there are times when you just need an expert on task quickly – whether that's an engineer, paramedic or marine.

What makes them truly game changing is the unconstrained ground mobility they offer. You can draw a straight line on a map and not worry about the terrain. Portable aerial mobility solutions will be incredibly valuable to small, agile, teams deployed on land or in littoral (coastal) environments.

A number of militaries around the world have approached us about using the jetpack just as other potential customers from the worlds of mining, construction, critical national infrastructure and leisure have expressed interest too. There is one main reason why people are so interested in our technology – semi-automated jetpacks allow the operator to achieve stable flight with little or no training. Furthermore, they can be flown hands-free. Their ease of use means that they can be used infrequently by non-specialists across a greater number of tasks.

Having a semi-automated flight control system means that jetpacks can also be re-configured as heavy-lift drones, opening up the possibility that they can be used for logistic tasks, or to lift casualties out of danger, far quicker than some conventional search-and-rescue methods – risking fewer lives in the process. Additional payload capacity over and above the weight of the pilot has typically been a constraint with jetpack designs, but this can now be overcome thanks to simple changes to engine configuration.

Increasingly complex defence, security and humanitarian challenges are demanding greater agility, flexibility and responsiveness in military operations. Rapid access over challenging topography or water, and access to inaccessible or elevated positions can provide a significant operational advantage.

The costs of current vertical take-off and landing (VTOL) solutions are substantial, particularly when you factor in equipment, maintenance, ground crew and pilot training. In comparison, a jetpack or heavy-lift jetdrone will allow short-range operational or logistical tasks of under five miles to be completed at significantly lower cost than helicopters. Short range, air mobility that doesn't require the infrastructure and costs associated with conventional aircraft will provide considerable strategic benefit.

YOU CAN DRAW A STRAIGHT LINE ON A MAP AND NOT WORRY ABOUT THE TERRAIN

Key military uses on land could include: unpredictable, low-altitude infiltration routes; rapid extraction of personnel (the jetpack can be air dropped or flown in autonomously); rapid cliff ascent; avoiding choke points and certain kinds of mined areas; far-bank security ahead of an obstacle crossing, for example rivers, swamps, damaged roads, walls, buildings, wooded areas; rapidly deploying elevated overwatch, fire teams or observation posts; and increasing coverage of engineers or medical specialists around the battlespace.

Meanwhile, in a maritime environment, jetpacks or heavy-lift drones allow for: amphibious landings (with greater access to previously inaccessible areas); maritime boarding operations; ship-to-shore and ship-to-ship transit; and vertical replenishment at sea (VERTREP).

Jetpacks: A long time in the making

When jetpacks enter service in the security industry, it means this technology will have gone full circle since the early days of development sponsored by the US military in the Fifties.

Development of the first jetpack – the Bell Aerosystems Rocket Belt – actually began earlier than that decade, but the first free flight wasn't performed until April 1961 after money had been thrown at the project by the US Department of Defense.

Until then test flights were tethered, as test pilots learned to bring the device under control.

Hopes were high. President John F Kennedy was treated to a demonstration flight and it even flew in the courtyard of the Pentagon. Officially called the SRLD – or Small Rocket Lift Device – it got off the ground by forcing pressurised hydrogen peroxide through fine-meshed screens of silver, immediately causing the peroxide to turn into superheated steam, resulting in a few hundred pounds of thrust.

In the end, though, a maximum flight time of just 21 seconds due to the weight of the pilot and the five gallons of hydrogen peroxide fuel put paid to any further development. This early version of a jetpack had its military contract cancelled as it had no real purpose.

The ambition to produce a jetpack strapped to the back of a pilot that had more practical uses other than thrilling watching crowds was to remain unfulfilled for decades to come. But that dream was never far from the public's imagination.

The Bell prototype itself was shown off across the US and flown around the world to be seen in action in Mexico, Argentina, France, Canada and Germany.

It has popped up in TV shows and famously flew at the opening ceremony of the 1984 Los Angeles Olympic Games. It even starred in a Bond movie, helping the invincible spy escape his enemies in 1965's *Thunderball*.

Further attempts at jetpacks by other companies have followed over the years, but it's only recently that improved technology and flight times have begun to hold the promise that they will be freed from the entertainment circuit.

All-important autopilot technology will help stretch fuel further, too. That's the sort of thing the original Bell Rocket Belt test pilot and developer Wendell F Moore could have done with. He shattered his kneecap after losing control of the device in February 1961, just two months shy of the first free test flight, which meant he couldn't perform the feat himself.

The problem of rapid access to inaccessible objectives is not limited to combat operations, but also isolated personnel, remote communities and assistance after natural disasters.

Unsustainable economic growth and development are driving changes in ecological, social and economic systems, which are altering patterns of hazards, human exposure and vulnerability. A cost-effective, easy to use, versatile personal aerial mobility system is needed by the security industry now more than ever.

SEMI-AUTOMATED JETPACKS PROVIDE THE OPERATOR STABLE, HANDS-FREE FLIGHT

When it comes to Humanitarian Assistance and Disaster Relief, emergency response and rescue scenarios, semi-automated and remote-controlled jetpacks can unlock: rapid access to remote communities; reach locations regardless of flood, transport infrastructure damage or ground obstacles; land with precision and avoid damage or injury with the downwash of a helicopter; and allow conventional air assets to be prioritised for longer range missions

The challenges of high noise and limited flight time remain, but they will fall away in the coming years as improvements are made. We are investigating an innovative method to reduce the noise signature from our engines and, as time passes, flight times will get better. We expect all providers will be doing the same things as us – focusing on boosting fuel efficiency, using sustainable bio-fuels and using novel approaches to fuel management as part of the next iteration of the technology. Jetpacks are not yet suitable for long-range tasks or flight operations where persistence on task is a requirement.

Regulatory hurdles also still exist, just as they do with any nascent technology. However, this is a well-trodden path and will be overcome, just as it is with all new kinds of aircraft. Some of that will relate to how and where they are being used.

The security industry will undoubtedly come to be regarded as one of the key customers for this technology, lowering costs through scale, which in turn will drive further evolution. This will add pace to improving technology that, for us at least, has already progressed at what feels like break-neck speed.

We've come from humble beginnings in a relatively short space of time, benefitting from business mentorship from our hosts at the University of Southampton Science Park. In less than two years, we've gone from using a small Innovate UK grant organised by consultancy Catax to winning innovation awards and having discussions with militaries to tailor our technology for their uses.

As if that wasn't enough of an indicator that the security industry is taking this technology seriously, DARPA, the United States Department of Defense Advanced Research Projects Agency has launched a $2-million funding opportunity for this kind of device. Now we're almost being overwhelmed by the use cases that people are coming to us with, many of which we hadn't considered before. We believe many of these applications will exploit the benefits provided by the semi-automated flight control system. Installing software so that jetpacks can stabilise themselves results in a dramatic reduction in the cognitive burden on pilots and eliminates physical fatigue when compared with other systems. Suddenly all these problems are gone when automation is introduced, simultaneously improving a jetpack's overall utility, safety and dramatically reducing any associated training costs. With so many applications within the security sector, it is destined to be transformed by a system that presents the bare minimum of barriers to human flight ●

Antony Quinn is a Companion of the Royal Aeronautical Society, Royal Navy Commander and co-founder of Maverick Aviation Ltd, which has created an intelligent, hands-free jetpack.

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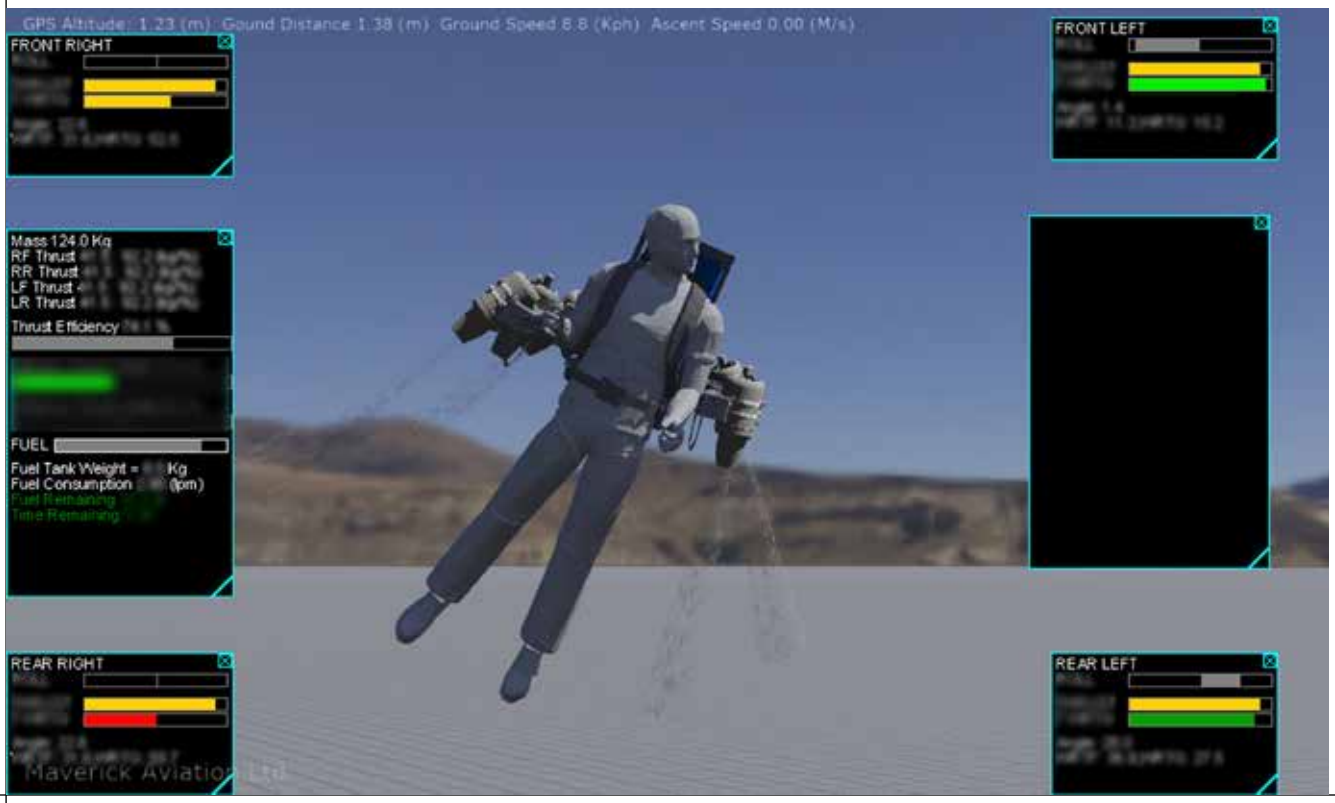

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