

Rugged interconnection systems for Special Operations

Bob Stanton, Director of Technology at Omnetics, talks to Soldier Mod about why connectors are so important when it comes to equipping troops for surveillance and special operations

Special operations has always played a key role in defence both in Europe and the US. But the changing nature of warfare means surveillance and special operations - and the equipment and technology they require - are increasingly a focus for defence tech across the world. What a special operations soldier or operative needs in the field has evolved, with an emphasis on smaller and lighter equipment that can simultaneously transmit and receive higher and higher amounts of data for both surveillance and relaying orders and actions. Such demands have seen the switch from information relayed in analogue formats to digital, and the movement of that digital data relies on connectors that can facilitate the transmission faster and in much greater volumes. At the same time, that critical information needs to be protected, along with the soldiers themselves to avoid detection and targeting.

While the stereotypical, and perhaps outdated, idea of someone in special operations is of a "guy in camouflage clothing sneaking through the woods stalking somebody", realistically a much larger part of such operations is data gathering, says Bob Stanton, outgoing Director of Technology at Omnetics. "The truth is, they've collected a lot of data beforehand. And the way its collected is through small, highly portable, remote instrumentation that collects massive amounts of digital data, and then sends that to the command centre or to the soldier in the field." Traditionally sent via radio waves or analogue transmission, information now relies on being sent digitally - a step-change in surveillance on the battlefield. Not only does such a change allow the transmission of large amounts of data, but is also easier to protect and shield so those doing the surveillance don't find themselves at risk. The connection and routing of high-speed digital signals within such systems is a challenge for systems engineers in defence across the board, but arguably even more vital in the world of special operations and surveillance, where the collection of large amounts of intelligence, is paramount to success.

Autonomous Surveillance

Similarly, autonomous equipment from UAVs for surveillance to tactical robots such as TALON have also seen developments in technology. Including multiple spectrum analysis, or hyper spectrum analysis, as well as additional light frequency ranges allowing them to "see" beyond the capability of the human eye. "Wider range use of frequencies and systems that reach beyond human limitations of electromagnetic spectrums of light allow the detection of images at a much higher level of detail and in environments where special operations may be undertaken", says Stanton. These could include seeing metal parked under a canopy of trees, or carrying out surveillance on an object or enemy where topography could hinder more traditional approaches. Such developments require connectors that can handle larger amounts of signaling, yet still allow for lower weight and smaller size. Energy conservation is also a factor to consider in the development of new systems and components, with some more aggressive systems requiring their own on-board energy. The added factor of power can have a potential effect on size and weight - both key when it comes to the effectiveness of devices in specific environments, especially special operations. "Now we've been out with these remote devices, whether it's a helicopter or a drone, it's amazing the amount that they carry. The drones, the helicopters and everything else need to be up there for a while when they're taking pictures. Lower weight and smaller size electronics lets them stay up longer because weight consumes energy while you're flying. So by using miniature electronics and miniature connectors and cables, it saves a lot of time and space while conserving energy."

The drive for smaller sized equipment that can cram a large amount of capability inside doesn't stop at surveillance and data collection, but is also key to the target detection and tracking systems that use the information gained from surveillance to take action. Those systems, says Stanton, require smaller, better connectors to allow them to carry



enough signals for the processing power not only to identify where a target is - but where it will be.

Shielding the soldier on the ground

The transfer of information isn't just limited to equipment carried by soldiers on special operations - but the clothing they wear. Alongside the need to shield those soldiers and their equipment to avoid detection, through measures including electromagnetic shielding; monitoring their safety through health monitors that can assess their physical stability and relay that information back to a command centre. "So we're back to electronics, cables, connectors and everything else. They have to be extremely small, extremely lightweight and, here comes the newest part - higher and higher speed. The way you manage the speed, for example, on a soldier, or even on some of this equipment, again requires power plus data processing, and maybe even the surveillance." The technology in today's soldier-worn equipment requires a new generation of connectors that can deal with a combination of two or three kinds of cable in one connector - hence the need for mixed signal or hybrid connectors, says Stanton.

Fast-moving developments in the technology needed by soldiers in special operations make it difficult to define standards at pace, notes Stanton. That dilemma alongside the strategic need for such equipment in the operational environment today and into the future means the need for the defence industry and component manufacturers to make certain allowances, relying on previous tried-and-tested elements to create new technology quickly and

efficiently. "The European and US defence industries have standard connectors that have been approved and tested for things like shock, vibration, inertia, and even in many cases for watertightness. You have all these specifications for how good they are. You also can have a specification for EMI shielding." But designing equipment for a new kind of army where surveillance and special operations is more commonplace than ever means having to compromise, using proven certified parts from established standards in new designs to ensure success.

"So that's the evolution of what this is doing and where it is going," Stanton summarises. "That's why small connectors are taking over. That's why high speed digital is showing up. That's why shielding and that sort of thing is so important now. And that's why surveillance, or cameras or whatever words you guys use is so critical, is that we don't charge in over the hill now with guns blazing like we did in World War Two or something. It's not done that way." ■

For more information, visit: www.omnetics.com

Email: sales@omnetics.com