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Aerial Surveillance

Surveillance Technology a Priority For Special Operations Forces

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The U-28, a modified Pilatus PC-12 single-engine turboprop

Advances in intelligence, surveillance and reconnaissance capabilities over the past 14 years of war have revolutionized information gathering and aerial strike. But members of U.S. Special Operations Command's aviation component face difficult technological challenges as they seek to improve their ability to find, track and destroy the enemy.

Although small unmanned aircraft play a critical role in the command's ISR mission, their limited room for antennas and power-generation capability creates data transport problems, according to officials.

John Coglianese, director of unmanned aerial systems at SOCOM, said the power plants in UAS groups two and three — which weigh between 20 and 1,320 pounds — are "not sufficient."

"What we're looking for in an unmanned system is power plants that can operate and provide the reliability that we see today in manned systems," he said in May at the Special Operations Forces Industry Conference in Tampa, Florida. "And holistically industry is not there, and so that is something that we're focused on now and we are focused on in the

future."

Air Force Col. Matt Atkins, head of SOCOM's intelligence capabilities and requirements division, said major improvements in sensor technology can be problematic for smaller unmanned aircraft.

"When you have a big platform like a Reaper that has a lot of power and wing space, then you can actually generate an ability to move the electrons off of it," he said. "Having a high-definition camera on that small airplane is great but your ability to blow those electrons off and then move them around is what really presents that challenge ... It's something we're going to continue to struggle with, and right now I think the sensor guys are probably ahead of the data transport guys in the race because there's a lot more investment in that."

The command is looking for assistance from industry to tackle the problem.

"We need innovative ways to move data off the respective collection platforms because every time we roll out a new HD sensor [or] a new widget ... we're crushing the data rates all over again. So we do need help in solving the data transport problem from a technological perspective," Atkins said.

Turning a mountain of data into actionable intelligence is another challenge facing the command. The analytical process has been compared to drinking water from a fire hose.

"That troubles us the most," Atkins said of intelligence processing, exploitation and dissemination, noting that the task is manpower intensive and costly. "We're looking for technology to buy down that ... Instead of having six guys working one single feed, [our goal] is to have one guy working six feeds and to sort of turn that business model."

Officials are trying to enable special operations units in the field to better process and exploit intelligence gathered by ISR platforms.

Atkins said the command's investment portfolio is now geared toward pushing intelligence processing down to the war fighters. Special operators need to take advantage of innovative software solutions, such as cloud-based computing and mobile apps, he said.

On the sensor front, the command is looking to improve its ability to track targets in difficult environments like triple-canopy jungles and urban areas. Officials also want sensors that are effective in poor weather conditions and at night.

In "the obscured environments, being able to maintain those tracks and those custody of targets" is critical, said Air Force Maj. Bernie Beigh, director of manned ISR and non-standard aviation at SOCOM. The command is looking for "innovative technology that can fit within our existing architectures ... to get after those tough target sets," he said.

Mike Fieldson, program manager for the AC-130J Ghostrider gunship at SOCOM, said the command is interested in "tactical off board sensing," which would entail launching sensors out of common launch tubes to fly below the clouds and relay images back to the aircraft through a command-and-control and communications system.

Air Force Lt. Col. Todd Darrah, strike systems team leader, told industry officials that he would rather have an advanced all-weather sensor on the plane itself.

"I would love to have a sensor that I could bolt on to my platform today [so] that I could

see through the clouds and shoot through the clouds," he said.

To better "finish" targets, the command is seeking new weaponry. The command fielded the laser-guided small diameter bomb last year, which is being used in combat. "The user feedback is extremely encouraging," said Erich Borgstede, program manager for fixed wing munitions at SOCOM. "I now have a difficulty keeping up with the inventory requirements."

Officials said the command will integrate a 105mm gun onto the AC-130J in the summer of 2016, and continue its efforts to integrate Hellfire missiles onto the AC-130J and AC-130W Stinger II.

The command has a new Do-328 demonstration aircraft — similar to the Dornier C-146A Wolfhound tactical transport aircraft used by SOCOM — for exploring new weapons and other technologies developed by industry. Officials said the command is looking for common launch tube compatible munitions.

"If you're a person out there that has a weapon and you can put in a common launch tube ... you can bring that to me and we'll put it on our airplane and test it out," Darrah said. Borgstede said SOCOM and two unidentified industry partners are developing new glide weapons that are common launch tube compatible. Officials took the munitions out to a test range and hit a variety of static and moving targets traveling at speeds of up to 50 mph, he said.

"We're still doing work on the ranges and in integration phases with both companies to see if we can bring this capability to fielding," he said, noting that the test results have been "encouraging."

Officials have submitted a rapid innovation fund activity for a warhead that can tailor how it detonates, Borgstede said. "We think that's going to be providing us something that we can stick in some of our glide munitions in the future. So if you've got a rapid innovation fund candidate, whether it's a warhead or seeker, I'm certainly interested in that," he said.

Perhaps the most advanced new combat capability that SOCOM is looking for is powerful lasers, a type of directed energy weapon. In May, Darrah said that in the next 90 days the command would likely be putting out a request for information about directed energy technologies and their level of maturity.

Major challenges of developing laser weapons include stability, beam control, optics and range. "Those are all areas that we are looking for people to do — not just one company [but] lots of companies because to integrate [a laser] onto a C-130 is going to be a challenge," Darrah said.
The command is also interested in nonlethal weapons. "We don't necessarily want to kill everybody every time," Darrah said.

When it comes to platforms, officials said their ISR roadmap calls for sustaining and upgrading high-end "Cadillac" quality aircraft like the Reaper, while targeting investments in "Ford" quality aircraft that can perform certain ISR missions at lower cost.

The command also plans to acquire a new-generation manned ISR aircraft to replace the aging U-28 — a modified Pilatus PC-12 single-engine turboprop.

Over the next nine to 12 months, officials will do an operational analysis to support the development of an initial capabilities document. Later, the command will conduct an

analysis of alternatives. "We're taking a very deliberative approach," Beigh said. "Here over the next couple years is really where we're approaching that analysis ... [to] determine where are we going."

Moving forward, improving the survivability of ISR platforms and other aircraft will be a high priority because officials anticipate operating in more highly contested airspace.

"We as an acquisition community need to give them the best systems possible so that they can ... go anyplace anytime and have a significant probability of coming home safely," said Air Force Lt. Col. John DiSebastian, C-130 and CV-22 program director. "As technology matures we need to look across the gamut of survivability," including electronic warfare, infrared and visual and acoustic signatures.

He said survivability concerns extend to drones: "We have limited assets, so we can't afford to sacrifice them just because they're not manned."

Because SOCOM has a limited number of ISR platforms and personnel, it has turned to outsourcing.

"There is a great bandwidth demand that as a government entity, from a resource and people side, we can't sustain, maintain and provide to meet the demand for ISR. And that is where really that [contractor owned/contractor operated] capability comes into play," Coglianese said.

Textron Systems' medium-endurance Aerosonde drone has provided more than 100,000 hours of operational service, primarily on behalf of SOCOM, according to David Phillips, the company's vice president of small/medium-endurance unmanned aircraft systems.

"We provide, kind of tip to tail, everything associated with executing the mission," he said. Textron owns the aircraft, which are operated, maintained and sustained by company employees.

"Basically we're paid for flying and delivering the data that our customer specifies," Phillips said.

He said the command benefits from such an arrangement with industry.

"It's a good business model and provides a great value for our fee-for-service customers like SOCOM because ... they don't have to worry about cost of ownership, they don't have to worry about the cost of obsolescence, they don't have to worry about operator and maintainer turnover," he said. "They outsource all of that."

Textron is competing for a new customer-owned, customer-operated Mid-Endurance Unmanned Aircraft System III contract with the command. The contract is expected to be awarded in November.

Going forward, Phillips foresees more business opportunities with the Defense Department for unmanned aerial systems companies. "I see that market as growing within the military because ... there is a lot of need for the capability," he said.

Photo Credit: Air Force

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