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MORE DURABLE AEROSTAT CAN PROTECT TROOPS FROM CRUISE MISSILES

Lighter-than-air vehicles have been in use for decades, dating back to the Zeppelin dirigibles of pre-World War I Germany. Today's modern incarnation, the tethered aerostat system, is used in some of the most technologically advanced surveillance missions by the US Military and its allies. The system consists of an inflatable aircraft known as an aerostat, equipped with surveillance or communications payloads. The aerostat is raised aloft thousands of feet, and relays real-time intelligence to decision makers on the ground. Aerostat systems can be optimized to detect low-flying missiles or aircraft, or equipped with optical sensors to detect activity on the ground. The unmanned aerostat system provides comprehensive surveillance at a remarkably low operating cost compared to manned aircraft and unmanned aerial vehicles (UAVs).

Currently, aerostat systems are deployed in support of US Military operations in Afghanistan and elsewhere in the Middle East, as well as in support of homeland security efforts in remote areas along the US-Mexico border. Both in combat and along the border, aerostats face the challenge of rough weather for long intervals of time, often up to thirty days of sustained deployment. TCOM LP of Columbia, Maryland, is meeting this challenge by developing a new hull material for its new 71M high Block II altitude heavy lift aerostats. TCOM has been designing lighter-than-aircraft systems for US and allied governments for more than 40 years including repeated deployments in the combat theaters of Afghanistan and Iraq. Whether as stationary systems, mobile deployments or deployed directly from vessels at sea, TCOM aerostats provide wide area persistent surveillance that military forces depend upon to achieve domain awareness.

According to Ron Bendlin, the president and chief executive officer of TCOM, the Maryland-based company developed its 71M Block II aerostats to fill the Army's need for a large persistent surveillance platform. "The greatest challenge in developing this system was meeting the demanding military environmental requirements. With respect to the hull material, achieving the right balance of physical properties to provide the durability and environmental resistance in a light weight material was the greatest challenge," he said. In meeting this challenge, the company leveraged its experience in developing breakthrough technologies in lighter than air products for more than four decades. "We use a composite construction, referred to as a laminate, to engineer each layer to provide optimal performance," explained Bendlin.

The 71M Block II high-altitude heavy-lift aerostat is an aerodynamically-shaped, flexible structure filled with inert gas to maintain a specific shape. The aerostat uses a combination to air and helium to achieve positive buoyancy and constant pressurization. This buoyancy carries the aerostat and a payload (typically sensors or communications equipment) to a determined altitude. It is maintained at a fixed position by a tether which, in the case of TCOM systems, provides power to the equipment and fiber optic paths for the sensor/communication data to be retrieved in addition to anchoring the system.

The ability of the 71M Block II to stay on station for 30 days or more at altitudes in excess of 10,000 feet makes this class of aerostat well-suited for long range surveillance. "Due to the low-operational cost when compared to manned and unmanned aircraft, these aerostats are often employed for border surveillance. Additionally, due to its ability to provide persistent coverage at a high altitude and look down over a wide area, the large aerostat is an ideal platform for cruise missile detection," noted Bendlin.

Designing the 71M Block II taught the TCOM design team that aerostat systems can be designed to meet the most demanding operating environments without sacrifice of mission capabilities. "These systems, while technically sophisticated, can be deployed effectively in harsh military environments," pointed out Bendlin. When asked what trends he has seen in devising aerostats for surveillance in military, homeland security, and even civilian law enforcement and fire prevention, the CEO replied, "As with other airborne platforms, we continue to see a customer desire to drive up operational readiness and payload capacity while simultaneously driving down both procurement and operational costs."

In general, aerostats will benefit from developments in sensors for the airborne market resulting in reduction in size, weight, and power requirements, opined Bendlin. "However, for aerostat-specific development, sensor developers should key on the much longer durations of use due to platform persistence and longer on-station time as compared to other platforms. Also, the aerostat provides a relatively benign operational environment for the sensor free of vibration," he said.

The armed forces and security agencies that deploy aerostats play a key role in fostering the development of advanced aerostats, suggested Bendlin. "Critical to the long-term success of aerostats is the continued development of operational concepts that employ the overhead persistence of aerostats in the most effective manner," he stressed. Aerostats by nature can enable beyond line of sight/over the horizon communications, high-throughput data transmission and long range persistent surveillance. When planners incorporate these capabilities into their operational concepts, providers such as TCOM have time to develop the necessary lift, duration, and footprint capabilities in an extremely cost-effective manner.

The TCOM CEO said that countries that require surveillance of a large area such as a contested border or issues with smuggling or piracy can greatly enhance their situational awareness with airborne surveillance. Due to the low-operational cost of aerostat surveillance, these same countries can afford to maintain that awareness in a persistent manner and overcome the limitations of manned and unmanned aircraft.

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