CASE STUDY

Upgrading UAV Automatic Landing Subsystems while Reducing Cost and SWaP

CURTISS-WRIGHT

DEFENSE SOLUTIONS

Challenge

- Need for SWaP-optimized computing solution for long-endurance UAV
- Obsolete Intel® part rendered current solution EOL
- Requirement to meet European safety regulations

Solution

- High-performance, ultra-small form factor mission computer
- Modified COTS (MCOTS) to leverage existing cabling, reducing cost and migration complexity
- CE Marked product with few export restrictions

Results

- Upgraded system with miniscule footprint
- Increased processing capability at a lower cost than outdated technology
- Compliance to safety regulations and extensive qualitative testing

Challenge

Unmanned Aerial Vehicles (UAVs) have been a significant advancement in military aviation. UAVs can be designed to log extensive continuous flight hours far exceeding the amount that can be requested of a human pilot, thus enabling long-endurance tactical surveillance, reconnaissance and combat missions to take place day and night, in any weather.

While size, weight and power (SWaP) constraints are an important consideration for embedded technology on any aircraft, UAV designers are especially concerned with reducing the physical footprint of all onboard systems. For unmanned aircraft intended to fly for 24 to 48 hours straight, every ounce counts toward making fuel supplies last longer, and a higher payload capacity can expand mission capabilities for Signals Intelligence (SIGINT), Satellite Communications (SATCOM), or other demanding applications.

When an obsolete Intel processor chip rendered its current solution end of life, a large systems integrator in the aerospace industry sought a new small form factor mission

The DuraCOR 311 (left) is half of the weight and size of the DuraCOR 820 system it replaced (right).

computer for the Automatic Take-Off and Landing System (ATOLS) on its Medium-Altitude Long-Endurance (MALE) UAV. Hoping to minimize the cost and complexity of the migration, this customer wished to move to the latest and greatest technology *without* having to change pinouts or cables on the aircraft.

Ideally, since the platform would be sold globally, including in Europe, the new mission processor solution would also carry a CE Mark, a certification indicating compliance to health, safety and environmental protection standards required of products sold in the European Economic Area.

Solution

The integrator's legacy solution, Curtiss-Wright's Parvus® DuraCOR® 820, had served as a reliable system for many years. At the time of purchase, its Intel Pentium® M processor offered some of the most advanced functionality available in a rugged system with a minimal physical footprint. Highly satisfied with the product, service and support it had previously received, this customer turned to Curtiss-Wright to evaluate a replacement. It quickly found, however, that advancements in small form factor technology meant its new system would deliver a substantial upgrade in functionality – at a fraction of the cost of its original solution.

The customer selected the Parvus DuraCOR 311, a rugged, Commercial Off-The-Shelf (COTS) miniature modular mission computer. Even at half the weight and size of the system it replaced, the DuraCOR 311 offered a significant increase in performance, with its quad-core Intel Atom™ system on chip delivering approximately four times the processing power and RAM of its predecessor's Pentium M chip.

Both the DuraCOR 311 and the customer's installed solution featured the same high-density circular connectors. In order to match the I/O that was currently being used, as well as the connector pinout assignment, Curtiss-Wright made a very simple modification to remap the DuraCOR 311's front I/O board and added additional RS-422 serial ports via a mini-PCIe expansion card. Requiring minimal development time, these low-cost modifications resulted in a Modified COTS (MCOTS) product that easily integrated with existing harnesses on the aircraft without delaying time to deployment or expense to re-work cables.

Results

With the DuraCOR 311 replacing its obsolete solution, this systems integrator was able to move to a newer generation of technology without having to change pinouts or cables on its aircraft. Designed leveraging Curtiss-Wright's years of experience and expertise developing defense solutions that are increasingly stronger, smarter, faster and smaller, the DuraCOR 311 delivered both performance and SWaP improvements to the UAV's ATOLS. And, even with modifications to the COTS product, this replacement solution was provided at 20% lower cost than the systems integrator's existing solution.

The DuraCOR 311 served as a true testament to Curtiss-Wright's reputation for reliable small form factor designs. The DuraCOR 311 was thoroughly prequalified through extensive MIL-STD, DO-160 and EMI testing – even exceeding the benchmarks the incumbent DuraCOR 820 was measured against. Implemented on this customer's widely deployed UAV, the DuraCOR 311 provides a truly dependable, rugged solution militaries can depend on. In addition, its CE Marking made it a readily available solution with very few export restrictions, meaning it's properly qualified for UAVs sold into European markets.

This simple tech insertion both increased the platform's longevity and renewed confidence that the customer's UAV would not only be supported, but could be continually upgraded with new technology enhancements throughout its lifecycle. Now a critical part of MALE UAVs sold around the world, the DuraCOR 311 is powering critical missions and ISR capabilities, day and night.

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