

Modified COTS Solution Extends Platform Lifespan and Mission Capabilities

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DEFENSE SOLUTIONS


Challenge

- Low NRE COTS electronic upgrade
- Integrated avionics, networking, and other I/O
- Passive cooling with MIL-STD qualification testing

Solution

- Rugged modified COTS (MCOTS) Intel® Xeon® LRU
- Pre-integrated I/O expansion capabilities in modular system
- Fanless IP67 chassis with MIL-STD and DO-160 validation

Results

- Program risk and cost reduced with trusted MCOTS solution
- Aircraft environmental and EMI compliance
- All functional requirements and unique delivery schedule met

Challenge

Aerospace integrators are often called upon to upgrade aging airframes with new electronic payloads to extend their lifespan and mission capabilities. One such integrator turned to Curtiss-Wright when upgrading a fleet of maritime patrol and surveillance aircraft for a Western European customer. As part of the upgrade, the customer needed new mission and avionics computers. The integrator sought a partner with a flexible commercial off-the-shelf (COTS) solution that could meet the required avionics, network, and sensor requirements with minimal non-recurring expense (NRE).

The new electronics would need to interface with legacy MIL-STD-1553 and ARINC 429 avionics data buses on-board. MIL-STD-1553 is common on military platforms and even

commercial applications (such as automotive, oil, subway, space) for control, as well as monitoring of critical systems. ARINC 429 is the predominant commercial avionics data bus standard used for receiving or transmitting data between avionics equipment.

The system integrator also required the mission computer to have a rugged chassis with MIL-DTL-38999 connectors that could be passively cooled without forced airflow or cold plates. The unit also had to run a Windows® operating system and integrate numerous I/O interfaces beyond MIL-STD-1553, ARINC 429, including Ethernet, USB, serial, and digital I/O. Finally, the processor had to be compliant with demanding environmental, power, and EMI specs, including MIL-STD-810, MIL-STD-461, and MIL-STD-704.



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Parvus DuraCOR 8043

Solution

Seeking an exportable (non-ITAR) and size, weight, and power (SWaP)-optimized solution, the integrator turned to Curtiss-Wright's Parvus® line of small form factor (SFF) mission system solutions, which are classified for commercial export under U.S. Export Administration Regulations (EAR). They selected a modified COTS (MCOTS) variant of the [Parvus DuraCOR® 8043](#) pre-integrated with the required interface cards. Rugged COTS I/O cards in PCIe/104 and mini-PCIe form factor were readily available to integrate and support their needs. Pre-qualified for demanding MIL-STD-810 environmental and MIL-STD-461/DO-160 EMC compliance, the 8043 boasts a fanless and wide temperature design. In addition, the unit features industrial temperature grade components, EMI filtering, and an isolated DO-160/MIL-STD-1275/704 power supply that protects against voltage transients.

The DuraCOR 8043 is a rugged, COTS, modular mission computer based on a quad-core (8-thread) Intel Xeon processor with multiple Mini PCIe® card slots and a stacking PCIe/104™ bus architecture. Since this system is based on an Intel architecture, there were no issues running Windows.

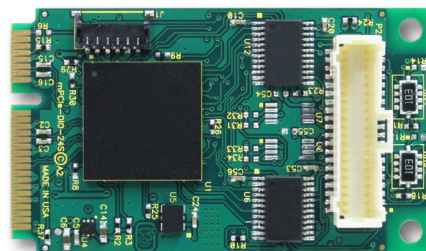
Thanks to the system's modular nature, it was able to accommodate a chassis I/O expansion segment below the base chassis to house multiple add-on cards. To meet avionics data bus requirements, our team of application engineers integrated MIL-STD-1553 and ARINC 429 cards from Data Device Corp (DDC), a trusted I/O card supplier.

To extend digital I/O (DIO) capabilities of the DuraCOR 8043 system, we also installed an mPCIe-DIO-24S card from ACCES I/O Products, another proven and responsive supplier for Curtiss-Wright. Their industrial-grade Mini-PCIe form factor module provided three 8-bit I/O ports, each of which could be programmed as inputs or outputs. The module featured multiple redundant balanced line physical layers, a differential network interface, time division multiplexing, and a half-duplex command/response protocol, and could handle up to 30 remote devices.

Results

Curtiss-Wright was able to provide the aircraft system integrator with a small, rugged, MCOTS solution that met all processing and I/O requirements, as well as MIL-STD qualifications. The system also met extensive DO-160 testing requirements, the international standard for commercial avionics equipment. As a result, this compliance meant significant risk reduction for the customer, with no additional qualification testing needed and minimal NRE for this MCOTS variant to be integrated.

Additionally, we were able to meet the system integrator's unique delivery schedule, which required staged deliveries over a three-year period, as they proceeded to upgrade the fleet of aircraft. As of today, all aircraft have been upgraded and are successfully operating with the new hardware.



Integrated mini-PCIe DIO card



Integrated mini-PCIe MIL-STD-1553 card