

**CURTISS -
WRIGHT**

Space Systems

Launchers. Re-entry. Satellites.



Trusted. Proven. Leader.

curtisswrightds.com

About Curtiss-Wright

Curtiss-Wright Corporation (NYSE:CW) is a global integrated business that provides highly engineered products, solutions and services mainly to Aerospace & Defense markets, as well as critical technologies in demanding Commercial Power, Process, and Industrial markets. We leverage a workforce of 8,600 highly skilled employees who develop, design and build what we believe are the best engineered solutions to the markets we serve.

Building on the heritage of Glenn Curtiss and the Wright brothers, Curtiss-Wright has a long tradition of providing innovative solutions through trusted customer relationships. For more information, visit www.curtisswright.com.

The Curtiss-Wright Space COTS Advantage

Curtiss-Wright helps reduce costs, development time, and risk by using a commercial off-the-shelf (COTS) approach that utilizes an extensive library of proven IP and decades of rugged system design experience. Our designers optimize systems for low cost of ownership based on a customer's application and the procurement life of the platform. The versatility of Curtiss-Wright's space COTS solutions has been thoroughly proven – no other COTS system has been qualified and used successfully in such a wide variety of space missions for both development flight instrumentation (DFI) and operational flight instrumentation (OFI) requirements.

The industry-leading design balances small size, low mass, and power with high performance and channel density. The modular and scalable systems utilize plug-in modules to access a wide range of digital and analog sensors, video, actuator interfaces, and data buses. Curtiss-Wright's space COTS products are reliable and have efficient thermal performance in a space environment. The unique Smart Backplane provides a low-cost, radiation-tolerant solution for protecting space COTS data acquisition systems from damaging radiation-induced latch-up events.

Curtiss-Wright has been the trusted supplier on a wide range of missions and with leading space organizations worldwide. Our heritage includes proven success in various launcher, sub-orbital, re-entry, and International Space Station (ISS) applications. Dedicated in-house space engineering and product assurance teams ensure the delivered hardware and documentation meet customer requirements.

Lower Cost

- Removes 'one-off' design costs by using modular COTS design
- Optimized for low cost of ownership based on customer application and procurement life of platform
- Reduced program cost and schedule risk through standard COTS test and integration tools

21st Century Design

- Compact size, low mass, and power with rugged high performance and channel density
- Designed for efficient thermal management in a space environment
- Modular, scalable system with proven radiation tolerant and reliable design

Experienced

- Proven on a wide range of space applications with leading space companies and organizations
- COTS approach leverages decades of research, development experience, and an extensive proven IP library
- Only supplier of Space Development and Operational Flight Instrumentation with same product line

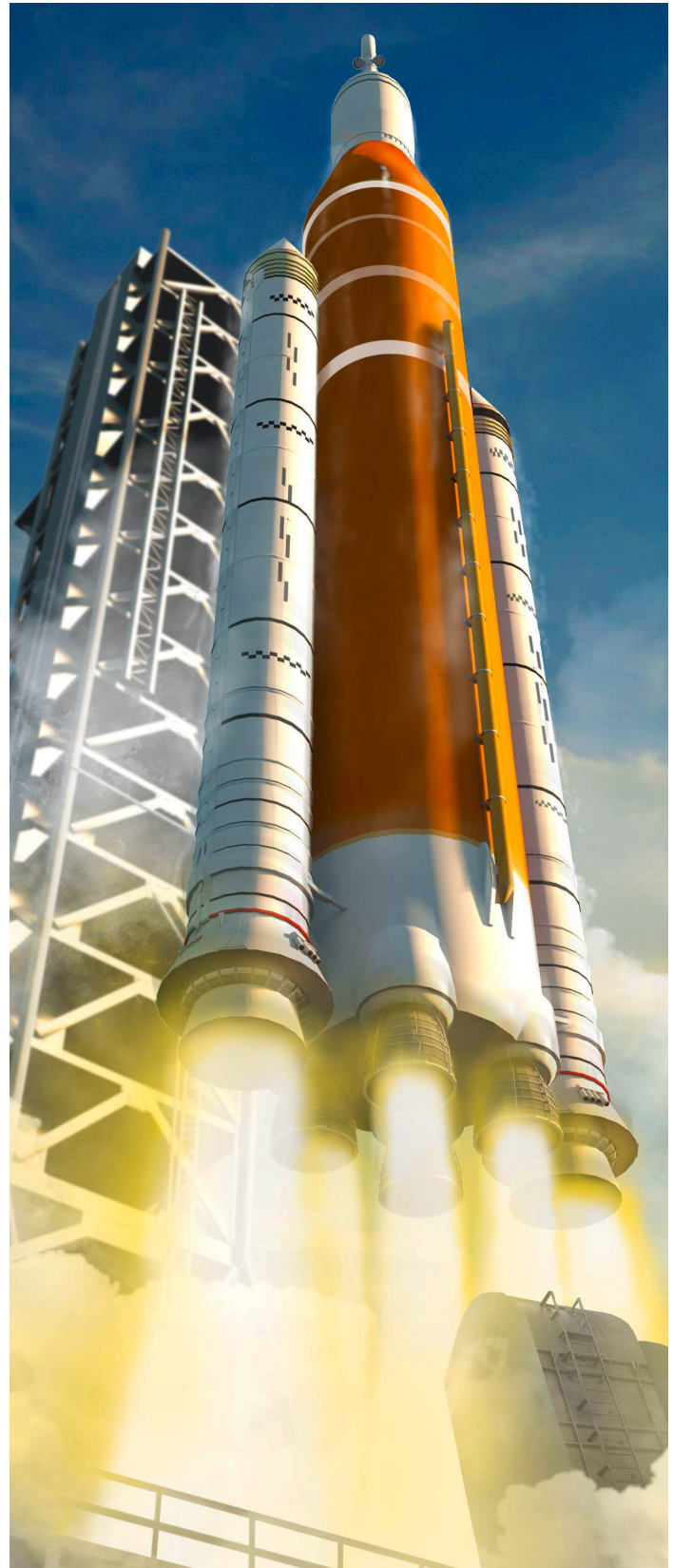
Heritage

Curtiss-Wright has experience on a wide variety of platforms and missions using the same COTS equipment in both development and operational applications.

- ESA IXV
- ULA Delta II
- ULA Delta IV
- ULA Atlas V
- Boeing CST-100 Starliner
- SpaceX Falcon 9
- SpaceX Dragon
- Boeing X-37 ALTV
- Virgin Galactic SpaceShip Two
- NASA Orion
- SLS Core Stage
- NGIS Antares
- ISS PLDR
- ISS ACLS
- Firefly Alpha
- ABL RS1
- VEGA-C
- Dream Chaser

Selected for:

- Blue Moon
- SLS Upper Stage
- Space Rider



Capabilities

Curtiss-Wright designs and manufactures rugged digital and analog leading data acquisition, data handling, video, recording, actuator control, Ethernet switch, and mission data processing systems. Standard products have been developed over decades and proven in a wide variety of space missions, including launchers, sub-orbital, re-entry and ISS. This unique heritage using the same core products was made possible due to our extensive IP library, implemented in a range of COTS equipment purpose-built for harsh conditions and with an inherent radiation tolerance. When required by the mission, optional redundancy and Smart Backplane radiation latch-up protection further increase reliability.

Applications

Launchers

- Networking for multi-stage launchers
- Data acquisition in extreme vibration environments
- Video capture, telemetry, and mission processing
- Integrated ruggedized recording available for reusable booster monitoring

Spaceplanes and Re-entry Vehicles

- Mission critical re-entry data handling and recording
- Video capture and telemetry
- Black out data buffering
- Latch-up tolerance

ISS Data Acquisition / Low Earth Orbit Platforms

- Microgravity acceleration measurement
- Onboard health monitoring
- Experiment / payload supervision
- Data recording and networking solutions

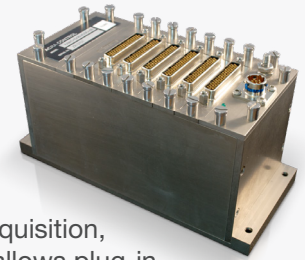


Features:

- Optimized development time and risk with reduced recurring cost
- Proven, reliable off-the-shelf products
- Optional enhancements for demanding and lengthy missions
- COTS approach leveraging an extensive library of IP
- Modular, scalable system
- Wide range of sensor and actuator interfaces and data buses
- Highly scalable Ethernet native single to multi-chassis systems
- Balances small size, low mass & power with high performance & channel density
- Designed for efficient thermal management in a space environment
- Proven radiation tolerant design
- Dedicated space engineering, manufacturing, and product assurance team

Data Acquisition Products

Curtiss-Wright provides leading data acquisition products with different levels of radiation tolerance to best balance the mission requirements against cost.



Latch-up Protected COTS Solution

The Smart Backplane chassis has been designed specifically with space-related data acquisition, data processing, and recording in mind. Its smart radiation-hardened backplane design allows plug-in COTS modules in a radiation-intensive environment without requiring those modules to have any built-in radiation protection. In the event of a Single Event Latch-up (SEL) on a module, the backplane detects this phenomenon and resets the module's operation. This operation eliminates the potentially harmful effects of ionizing radiation (module electronic circuit malfunction). The backplane provides continuous health status information to the on-board mission computer as well as a watchdog capability.

- Designed using Rad Hard components allowing re-use of COTS plug-in modules, minimizing cost
- Detects SELs and corrects for regular operation, ensuring reliability
- Minimizes power consumption through different mission stages

Space COTS Solution

The data acquisition and transmission systems consist of a chassis, a backplane controller, and user-selected modules. They are driven by a 'works once, always works' philosophy to make them extremely reliable. This low-power design results in less heat, and coupled with its compact size and MIL-SPEC ruggedness, makes it ideal for installing in locations that have limited space and are subject to harsh environments. This mature architecture has remained stable for over a decade thanks to the future-proof design philosophy.

- Highly rugged, compact, and low-power design
- Robust finite state machine architecture
- Synchronous sampling of all sensors across the network

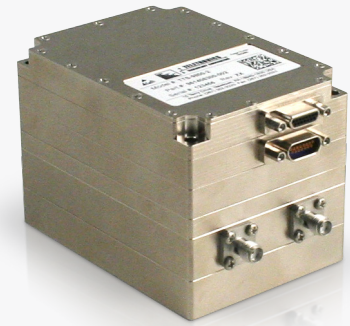
Recording Products

Curtiss-Wright recorders are rugged and compact, and utilize removable COTS solid-state media. The range features data recorders with integrated data acquisition capabilities and miniature bus recorders.



Telemetry Products

Curtiss-Wright telemetry systems are high-performance, dependable, economical solutions for flight and remote ground-based applications requiring accurate transmission of telemetry, digital, wideband, and video data. We provide flight termination receivers, airborne telemetry receivers, radar transponders, and telemetry transmitters.



Multi-Band Multimode Transmitter

Video Products

Curtiss-Wright provides rugged camera products and systems that can capture, convert, route, transmit, record, view, and test imagery. All cameras are ruggedized for harsh aerospace environments and come in high-definition, IP, and high-speed varieties.



HD IP Camera

Ground Support Equipment

Networking Products

Curtiss-Wright switches meets the unique requirements of high-reliability networking in harsh conditions. These include advanced Quality of Service filtering models, intelligent IP network management capabilities, Cisco IOS-based data, video and voice services, and modules with hardwired switching for deterministically predictable data output.

Features:

- Rugged and compact with low mass and power
- Live at power-up/fast boot options
- IEEE 1588 PTP Grandmaster and transparency, SNMP support
- Store and forward switching architecture



DuraNET Ethernet Switch

Rugged Processor Products

Parvus DuraCOR small form factor processors are highly scalable, modular subsystems for applications such as pre-launch avionics and laboratory experiments.

- Size, Weight, and Power (SWaP) optimized with transient protected power supply
- High-performance computing and graphics engines with open architecture I/O module expansion




DuraCOR Processor



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