HIGH-SPEED, HIGH-PRECISION MOTION CONTROL SOLUTIONS FOR CRITICAL DEFENSE SYSTEMS

CURTISS-WRIGHT

CURTISSWRIGHTDS.COM

TRUSTED
PROVEN
LEADER

AIR LAND SEA

INCREASE SPEED, ACCURACY, AND CONTROL WITH COMPLETE CONFIDENCE

Bring new levels of speed and accuracy to mission-critical defense systems with rugged, high-precision, and fully configurable motion control solutions from Curtiss-Wright. Our scalable solutions are designed to control and stabilize complex defense systems, including:

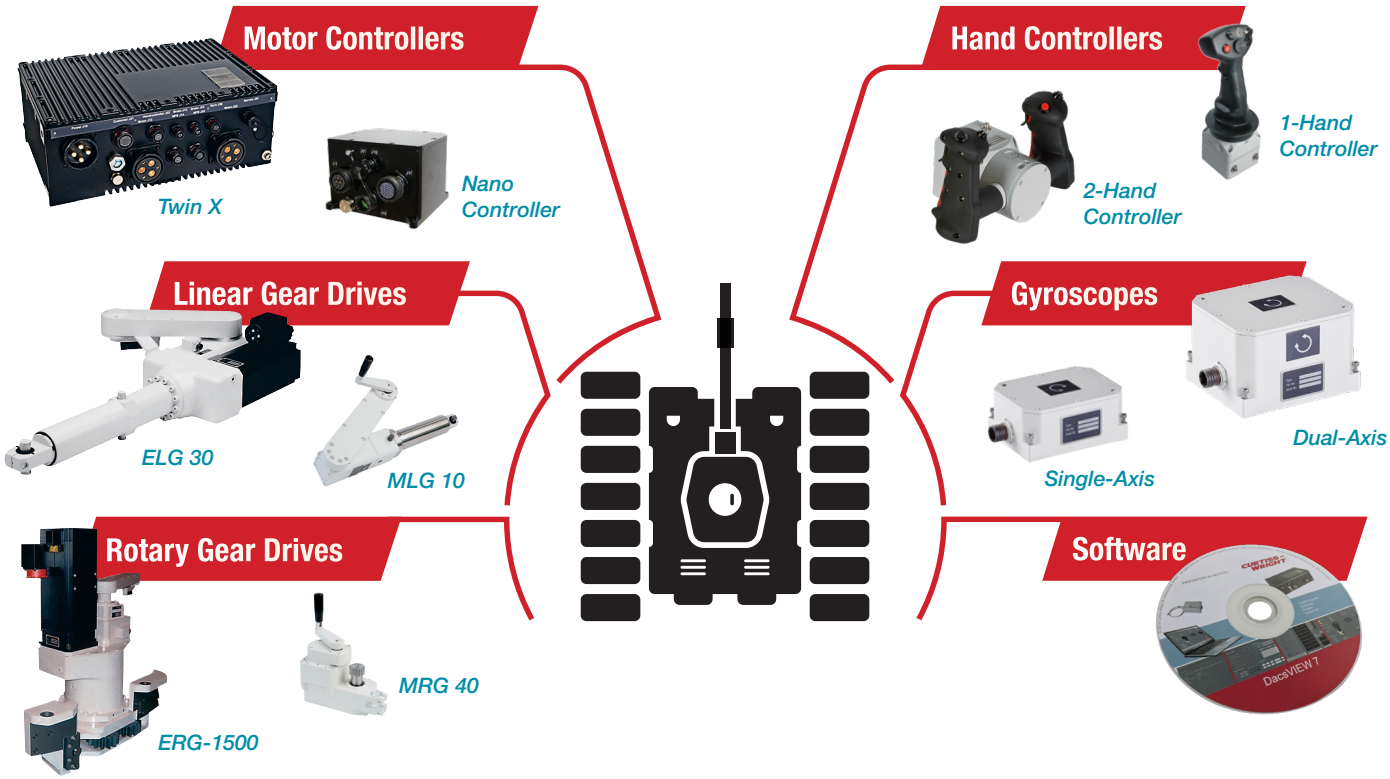
- Weapons and turret systems on land-based vehicles
- Ammunition handling and loading systems
- Rapid actuation direct-drive systems
- Missile launchers
- Mounted camera systems
- Radar and satellite systems

The possibilities are almost endless. Bring us your motion control challenges and we can control and stabilize the movement of any system on any defense platform in motion.

Every solution we deliver is engineered to meet your unique program, performance, and environmental requirements with unmatched levels of precision and reliability. With a modular approach to solution development and more than 70 years of experience in a wide variety of motion control applications, we know how to deliver tailored motion control systems on spec, on time, and on budget — every time.

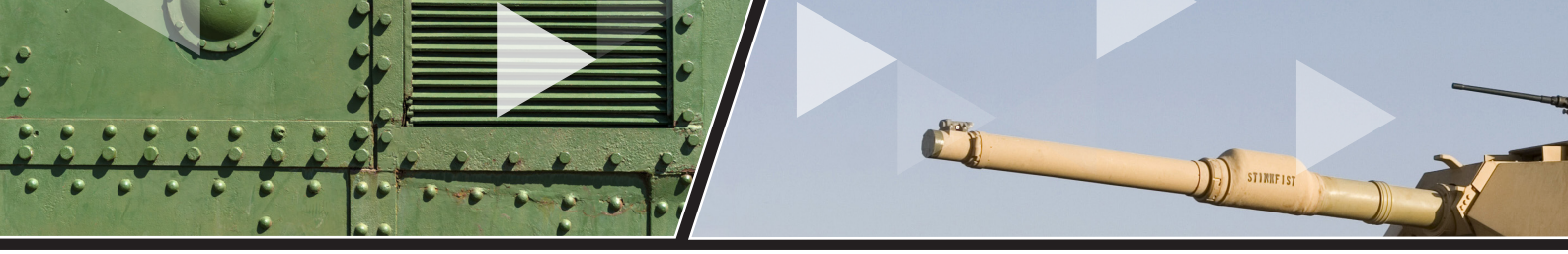
Accelerate Development with Proven Building Blocks

Our modular motion control solutions are built on a selected portfolio of rugged, field-proven components:



We supplement these building blocks with the hardware, software, and services that meet your unique requirements. Our evolutionary approach to development allows us to quickly adapt and configure existing components to meet the most challenging motion control and stabilization requirements. It also ensures that each solution we deliver incorporates the latest advances in motion control and inertial stabilization technology.

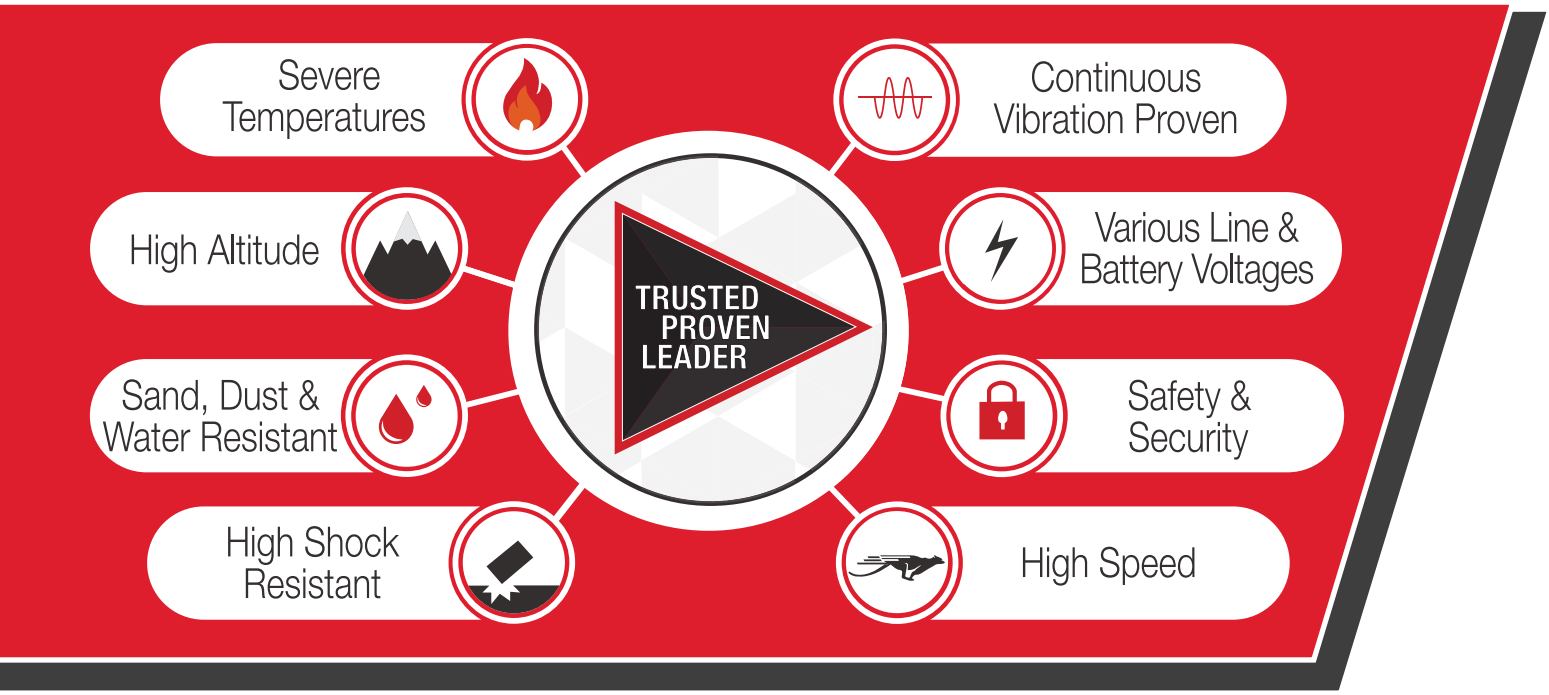
Most importantly, our building-block approach and advanced development processes allow us to cost-effectively jump-start delivery of fully integrated motion control solutions to accelerate time to market and reduce risks.



Stabilization and Control in Harsh Environments

Our motion control solutions are engineered to precisely stabilize and control high-speed movements. Every component undergoes extensive testing to ensure it performs reliably and accurately in the most rugged geographic locations and the most severe weather conditions. As a result, our solutions inherently ensure the safety of personnel and equipment in the harshest environments including:

- Extreme heat and cold
- High-altitude locations
- Sandy, dusty, and wet environments
- Bumpy, potholed, and rutted terrain



RELY ON ROBUST PROTECTION FUNCTIONALITY

To ensure reliable operation in any environment, all of our motion control solutions include:

- Over-current protection
- Over-temperature protection
- Short-circuit protection
- Electromechanical interference (EMI) protection
- Over-torque protection (if applicable)

Maximize Safety with Standards Based Solutions

Solution safety is crucial. We take a structured approach to motion control system design to ensure that critical safety features are designed into every aspect of our solutions from the initial concept stage to lower level components such as motor controllers, gear assemblies, and sensors. Our solutions are developed according to key safety and functional safety standards, including:

+ DEF STAN 00-56
+ MIL-STD-882
+ DO-178
+ IEC 61508

MAINTAIN ACCURATE TURRET CONTROL

To increase the safety of personnel and equipment during missions, modern armored land vehicles must be able to accurately locate a target and stabilize a shot, even while speeding over extremely rough terrain.

Our motion control solutions for turrets on tanks and other armored vehicles are engineered to provide stabilized aiming that is reliable, cost-effective, and tailored to meet extremely demanding program and platform requirements.

AIMING AND STABILIZATION SOLUTIONS

Our modular Turret Drive Servo System (TDSS) provides the highest degree of motion control and stability available for battle tanks, infantry fighting vehicles, and remote weapons stations. The TDSS is available in three standard configurations:

- **Manually Operated**

  Engineered for mechanical movements with a manual drive.

- **Electromechanically Operated**

  Engineered for electrical movements with a servo drive.

- **Gyro-Stabilized**

  Engineered for electrical movements and basic to high-performance stabilization.

These standard configurations can be adapted to meet the needs of any platform and provide an easy upgrade path from a lower cost solution to a fully stabilized system.

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AUTOMATE AMMUNITION HANDLING AND LOADING SYSTEMS

High-speed, high-precision control of ammunition handling and loading systems improves firing performance while simplifying handling and increasing safety for crew members.

Our flexible motion control solutions for ammunition handling and loading systems can be tailored for a wide variety of platforms, spaces, and locations.

+ Improve firing performance on self-propelled, towed, or auxiliary-propelled howitzers as well as fortress guns.
+ Retrofit compact and modular motion control solutions on the most space-constrained stationary and mobile artillery platforms.
+ Rely on fully ruggedized motion control solutions to improve control of ammunition handling systems in the harshest field and climate conditions.

AMMUNITION RAMMING SOLUTIONS

Our motion control solutions for ammunition ramming systems accelerate rates of fire, ensure enduring fire power, and enable non-stop performance with highly reliable loading cycles and smooth ammunition handling.

Working conditions for crew members are simplified and inherently safe. With automated ammunition ramming, fewer crew members are required to handle ammunition, they experience less physical strain, and they no longer have to deal with the difficulties of working with ammunition in highly constrained spaces.

OPTIMIZE DIRECT DRIVE ACTUATION

Numerous defense systems rely on direct drive technology. Our flexible direct drive solutions can be incorporated into any defense system that requires robust and reliable drive technology. Each solution is optimized for the platform, the environment in which it operates, and the required performance level. Solutions are designed to meet key military standards and include stabilization technology to support weapons systems and platforms in motion.

RAPID ACTUATION DIRECT DRIVE SYSTEM

Our Rapid Actuation Direct Drive System (RADDS) enables weapons systems to fire and hit targets in the blink of an eye. The RADDS delivers the highest possible acceleration and speed while maintaining shot accuracy. This direct drive solution is ruggedized and weatherproofed to military standards such as MIL-STD-810, and provides position accuracy to less than 0.1° with extremely fast movements on the X and Y axes.

For intrinsic safety, our RADDS includes holding brakes and redundancy for all safety functions. The RADDS can be delivered in different sizes and in different designs to accommodate varying numbers of extremely fast-moving launchers and other mounted weapons.

PRECISION MISSILE LAUNCHER MOVEMENTS

Missile launchers on moving platforms must be very quickly and safely put into the most accurate and stable position possible every time they are moved, making highly reliable movements essential with no room for error or inaccuracies.

The key is to quickly and simultaneously control and stabilize all axes of missile launcher movement when its capabilities are needed most.

We understand the many complexities associated with controlling and stabilizing missile launcher movements and have developed solutions that are field-proven to synchronize motions with superordinate guiding systems, such as sight systems and fire control units.

> *“Our flexible direct drive solutions can be incorporated into any defense system that requires robust and reliable drive technology.*

STABILIZE VIDEO FEEDS FROM MOUNTED CAMERAS

Drivers and of military vehicles and aircraft rely on visuals from mounted camera systems to navigate, maintain surveillance, and detect threats.

To improve situational awareness and ensure the safety of personnel and equipment, video feeds from mounted cameras must be as steady and smooth as possible, even when platforms are moving quickly in extremely harsh conditions. And cameras must have the ability to quickly and fluidly rotate and tilt to capture the right images at the right time.

Our cutting-edge, stabilized camera solutions use the most advanced motion control and stabilization technologies available today to eliminate shaky video feeds.

MOUNTED CAMERA STABILIZATION SOLUTION

Our mounted camera stabilization solution combines sophisticated motor controllers, gyroscopes, hand controllers, and traverse and elevation drives to ensure cameras remain steady at higher speeds and in more challenging conditions.

Drivers have an exceptionally rugged and steady remote-controlled camera platform that can smoothly capture images in any location and any weather conditions.

ACCURATE, RELIABLE POSITIONING RADAR AND SATELLITE SYSTEM

To detect threats in real time, military personnel must be able to quickly and precisely position and reposition radar and satellite systems. The drives and motors that control these motions must deliver the highest possible levels of ruggedness, reliability, and accuracy. When radar and satellite systems are deployed on moving vehicles, stability must also be ensured.

Our rugged motion control and stabilization solutions for radar and satellite systems are built from the ground up to reliably position these heavy systems on stationary and mobile platforms in any weather conditions. They provide the torque required for quick and smooth system movements that result in extremely accurate and consistent positioning. As well, they provide the fine control capabilities needed to position radar and satellite systems to the smallest degrees of precision.

PARTNER WITH AN END-TO-END PROVIDER

At Curtiss-Wright we take a complete life cycle approach to drive solution development and support, from project conception to reliable field operation for up to 30 years. You have everything needed to reduce risks, time, and costs at each stage of development and deployment including:

+ Expert engineering services for simulation and prototype development as well as fully integrated software, hardware, and systems
+ Program management services that keep you informed every step of the way and guarantee optimal cost efficiency
+ Extensive testing services at the qualification, stress, production, and series testing stages
+ Local industrialization support
+ Complete commissioning services
+ Obsolescence management services
+ Maintenance, repair, and overhaul (MRO) services

Rely on Swiss Quality and Precision

As a Swiss company, our strong focus on quality, reliability, and environmental protection allows us to tackle tougher terrain, reach higher speeds, and seize new opportunities. We are certified to ISO 9001:2015, and we achieve the highest possible quality standards through use of:

+ Stringent test methodologies and sophisticated test equipment
+ Compliance to the Restriction of the use of certain Hazardous Substances directive (RoHS) and the regulation on Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH)
+ Model-based software development in accordance with IEC 61508

Leverage a Legacy of Trust and Innovation

Curtiss-Wright Defense Solutions has been a part of Curtiss-Wright since 1999. As the trusted, proven leader in comprehensive, rugged, mission-critical solutions for the defense and aerospace industries for more than 80 years, Curtiss-Wright understands how to deliver exceptionally reliable solutions that reduce program risk.

From innovative COTS modules to highly engineered and fully integrated systems, Curtiss-Wright provides technology insights, engineering innovation, application experience, and regulatory knowledge that is trusted by defense departments, commercial avionics companies, and system integrators worldwide.

A Pioneering Spirit

The spirit of innovation at Curtiss-Wright Corporation (NYSE:CW) reaches back to the first flight of the Wright Flyer by Wilbur and Orville Wright at Kitty Hawk, NC, and the American aviation and motorcycling pioneer, Glenn Curtiss.

Today, as a global corporation with thousands of employees worldwide, we continue to apply the spirit of our founders to everything we do, pressing forward in the quest to achieve feats of scientific achievement and technology advancement once thought impossible.

At the Curtiss-Wright facility in Switzerland, we employ more than 100 people who are dedicated to upholding the legacy and core values of Curtiss-Wright in every aspect of our operations.

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