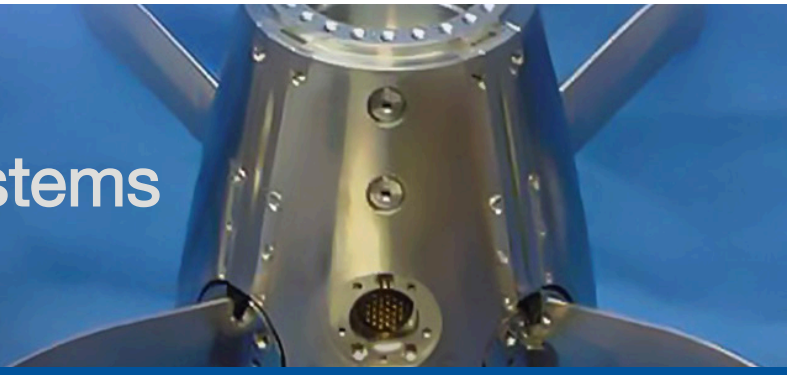


# Control Actuation Systems



General Dynamics Ordnance and Tactical Systems is a premier developer, manufacturer and integrator of Electromechanical Servo-Control Actuation Systems (CAS). For over 30 years, we have provided full service engineering and manufacturing of custom electromechanical control actuation systems used to guide the flight trajectories of rockets, missiles, and space interceptors.

Our tactical CAS designs work under extreme thermal and vibration environments while having the highest dynamic performance in the small, lightweight packages. Our space system products, built under the highest level of quality assurance, provide ultra-fast response times that allow “kill vehicles” to precisely intercept the correct location on incoming ICBM warheads.

## Gun Hardened CAS

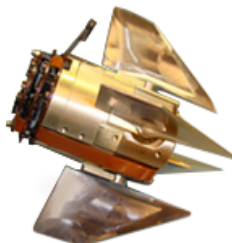
The gun hardened CAS are used to turn artillery shells into cost effective, guided munitions. The CAS must survive accelerations from the gun launch in the range of 15,000g to 30,000g and then reliably operate. The post launch operation typically has two complex mechanical motion functions: fin deployment and fin actuation.



Aerodynamic fins are stored inside the shell during initial ballistic flight to extend the range. After the fin deployment mechanism locks the fins into their extended state, the CAS responds to guidance commands that steer the shell into the target. Gun launched munitions offer significant cost and logistical advantages over propulsion launched systems.

## Tactical Missile CAS

Our tactical missile CAS have made enormous advances in performance density. First, they offer high levels of operation in the torque vs. speed domain. Secondly, they have exceptionally high fin position loop bandwidth (ultra-fast response to position commands). Lastly, they meet this torque, speed, and bandwidth levels in small packages. The small packages are designed to tight margins, allowing the tactical missile to use the available weight and length to enhance range or lethality.



## Strategic Systems Actuators

The strategic system actuator designs leveraged the Tactical Missile CAS performance density and added in extreme environments with long flight times. The bandwidth, power, and precision of these control actuators enable the Throttleable Divert and Attitude Controls System (TDACS) unparalleled guidance and control accuracy. To enable the TDACS mission performance, these CAS are purposely designed to thermal and structural limits that are verified through arduous testing and analysis. The manufacturing methods operate under the strict Mission Assurance methods required by the Missile Defense Agency.

