MISSION CRITICAL DEFENSE SOLUTIONS

EQUIPPING THOSE WHO DEFEND FREEDOM
MOOG DEFENSE
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ACROSS AIR, LAND AND SEA PLATFORMS

ROTOR WING
- Weapon Stores Management Systems (SMS)
- Flight Control Systems
- Missile Launchers
- Vibration Control
- Slip Rings

AIR
- Flight Control Systems
- Stabilized Motion Control for Turrets
- Engine Control Systems
- Media Converters/Ethernet Switches

LAND
- Flight Control Systems
- Weapon SMS
- Missile Launchers
- Actuators
- Vehicle Management Systems

SEA
- Thrust Vector Control
- Fin Control
- Wing Deployment
- Divert and Attitude Control
- Thrust Vector Thrusters
- Seeker Motors

MISSILES & KILL VEHICLES
- C-UAS Systems
- Integrated Sensor & Tracking Systems
- Weapons Scoring
- Trajectory Analysis
- Pan/Tilt Positioners & Tripods
- EO/IR Systems
- Automatic Runway FOD Detection

SENSORS AND SURVEILLANCE
- Radar Deployment Systems
- Cooling Equipment Units
- Slip Rings

RADAR
- Turret Weapon Systems & Integration
- Stabilized Motion Control
- Driver's Vision Enhancer
- Fire Control
- Ammunition Handling

COMBAT & TACTICAL VEHICLES
- EH to EM Conversions & Upgrades
- High Power Elevation & Azimuth Control
- Weapon SMS
- Slip Rings

LAUNCHERS
- Border/Perimeter Security
- Mobile/Stationary Surveillance
- Critical Infrastructure Protection
- Tactical Missiles

SENSORS AND SURVEILLANCE
- G/ATOR
- AN/TPY2
- Sentinel
- O33
- MEADS
- Aegis

RADAR
- LAV-A1/25
- Stryker
- CV90
- PZH 2000
- Bradley
- Abrams
- M113AS4

COMBAT & TACTICAL VEHICLES
- MML
- HIMARS
- MLRS

LAUNCHERS
- Virginia-class
- Columbia-class
- Scorpene-class
- Barracuda-class
- Dreadnought-class
- Types 45 | 23 | 122-124

SUBMARINES
- Ford-class Aircraft Carrier
- Littoral Combat Ship
- Echo Voyager
- XLUUV (Orca)
- UUV-FoS (Snakehead)

SURFACE VESSELS
- EM Actuation
- Weapon SMS
- Stabilized Motion Control for Turrets
- Gun Control Units
- Ammunition Handling

AUV
- Propulsion Systems
- Steering & Dive Control Systems
- Subsea Utility Motors

MM:
- North America
- South America
- Europe
- Asia
- Australia
- Africa

DID YOU KNOW THAT MOOG HAS LOCATIONS ON SIX CONTINENTS?

ROTOR WING
- Black Hawk
- V-22
- Seahawk
- S-92 | S-76
- AW119 | AW159
- V-280

FIXED WING
- F-35
- AC-130J Ghost Raider
- Caravan
- Eurofighter
- AT-802L
- X-47B
- Mantis
- Predator
- Gray Eagle

MISSILES & KILL VEHICLES
- Hypersonic Missiles
- Strategic Missiles
- Tactical Missiles

UAS
- Tarsier®
- X-47B
- Mantis
- Predator
- Gray Eagle

EQUIPPED WITH
- SUBMARINES
- SURFACE VESSELS
- AUV

CAPABILITIES
- EXPERIENCES
INTERCEPTOR AND KILL VEHICLE STEERING

Today’s sophisticated Ballistic Missile Defense (BMD) Systems rely on Divert and Attitude Control Systems (DACS) to steer the Kill Vehicle (KV) through the final intercept trajectory. At the heart of the DACS are Moog thruster valves which precisely meter the flow of propellant to the rocket engines used for KV steering.

DIVERT AND ATTITUDE CONTROL SYSTEMS (DACS) EXPERIENCE

- Thruster Valves
- Regulators
- Service Valves
- Tanks

MAJOR INTERCEPTOR PLATFORMS

- Thaad
- EKV/RKV
- Patriot
- Aster 15 / 30
- VT-1

MISSILE CONTROLS

From tactical to strategic missiles, from close air support to long range hypersonic, Moog leads the industry in providing precision flight control actuation systems.

MISSILE CONTROL EXPERIENCE

- Fin and Canard Control Actuation Systems (CAS)
- Missile Thrust Vector Control Systems
- Seeker Motors
- Wing Deployment Actuation Systems

MAJOR MISSILE PLATFORMS

- HELLFIRE®
- JAGM
- AMRAAM
- TOW
- HAAWC
- SM-6
- Tomahawk
- SGM
- Trident
- MALD

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WEAPON STORES MANAGEMENT SYSTEMS (SMS)

The Third Generation Weapon Stores Management System (SMS) is a modular COTS weapons control system that seamlessly integrates with aircraft sensors and mission management systems to provide the crew with a superior fire-control solution.

This proven, lightweight rugged system is an affordable solution to stores management on air, land and sea platforms. The SMS leverages Moog’s extensive experience in systems integration, internal software development, weapons technology, and fire control solutions. The flexible modular design of the SMS enables fast delivery, rapid integration and future upgrades to the sensors, avionics and weapons ensuring the SMS’s value for future mission requirements and weapons expansion.
LAND

TURRETED WEAPON SYSTEMS

Moog designs, manufactures and integrates weapon systems, sub-systems and products for a variety of global military vehicle platforms. You can gain access to the expertise in fire control, gun control, weapon stabilization, and weapons integration found on over 30 of the world’s leading military vehicle platforms including manned and unmanned turrets and remote weapon stations. Small, medium and large caliber weapons are equally supported by Moog technology.

RECONFIGURABLE INTEGRATED-WEAPONS PLATFORM

RIwP is an innovative remote weapons platform offering multiple weapon options to guarantee tailored overmatch in every combat situation. Engineered with many advanced features, RIwP includes high-performance target acquisition technology and unmatched pointing/stabilization accuracy ensuring U.S. and allied forces see first, engage first and achieve mission success. Additionally, the RIwP offers an unprecedented range of platform weapon system interoperability and allows the warfighter both reload under armor and in-field weapon reconfigurability.
FLEXIBLE MISSILE PLATFORM (FMP)

Meeting an increased demand for ground launched anti-tank/anti-air weaponization, Moog has applied key technologies of launch control, aiming and platform stabilization to the mechanical integration required to achieve reliable and consistent launch parameters.

Global militaries already trust and rely on Moog’s expertise in stabilization, fire control, power distribution and management, and weapon stations. The FMP exploits multiple Moog technologies and these are a foundation for anti-tank/anti-air missions required by today’s dynamic military forces. Flexible in both mission and missile, the FMP is an affordable way to weaponize a variety of vehicles.

LAND (CONTINUED)

WEAPON SMS

Moog’s Weapon SMS are customizable for air, land and sea. Successful test fires have been conducted from trailers, and military vehicles. SUVs and Vans can also be weaponized.

(see more on Moog’s Weapon SMS solution on pages 6 and 7)
Moog is an OEM for existing and future launcher programs providing elevation and azimuth precision control as well as power and data transmission. Moog also works closely with vehicle manufacturers and the armed forces to upgrade, convert, and reset existing assets. Our modeling, hardware, software, mechanical and production engineering teams are experts in both electromechanical (EM) and electrohydraulic (EH) motion control systems and technologies, providing system upgrades to meet strict space, weight, and power constraints.

We have developed patented high-redundancy, fail-safe, EM actuation systems offering users reassurance in power failure conditions.

EXPEDITIONARY RADAR DEPLOYMENT SYSTEMS
Moog provides motion control products, integrated subsystems, complete single and multi-axis actuation systems for land radar platforms, including:

• Antenna Elevation and Fold Actuation
• Point and Stare Actuation
• Azimuth Drive Motor, Controller, Actuation
• Automatic Leveling Actuation
• Integrated Rotary Joint Assemblies
• Hydraulic to Electric Conversions
• Communication Networking Products

RADAR COOLING EQUIPMENT
Our line of brushless DC fan motors provide extremely reliable cooling for critical defense radar equipment. As a crucial element of U.S. national missile defense, such systems operate in some of the harshest environments on earth, and when called upon absolutely must function as designed every single time. Moog provides greatly enhanced manufacturability, reliability and performance to this mission essential equipment. We also supply associated electronic controls for cooling systems, providing a complete turnkey solution to the customer.
SENSOR AND SURVEILLANCE SYSTEMS
Moog designs, produces, and integrates high-quality, scalable physical security solutions for extreme environments. Our unique offerings enable 24/7/365 asset protection, threat intervention, border protection, and communication around the world. From surveillance accessories to fully integrated customized solutions, Moog provides reliable surveillance products to the defense market.

POSITIONERS, TRIPods AND CAMERA SYSTEMS
Moog supports RF Satellite communications and surveillance for military applications.
• Pan and tilt positioners designed to handle payloads requiring up to 500 foot pounds of elevation torque with precision and accuracy
• Tripods able to support and position systems with unsurpassed reliability and performance
• Camera Systems available in short, mid, or long range options for 24/7 surveillance in any environment
• Driver’s Vision Enhancer (DVE) for rugged mobile military applications

LAND (CONTINUED)

VIDEO TRACKING AND INTEGRATED SYSTEMS
From stand-alone video tracking cards to fully integrated tracking systems, Moog can meet your mobile, fixed and portable tracking needs with comprehensive, sophisticated solutions.

Solutions:
• Electronic Warfare
• Missile Tracking
• Trajectory Analysis
• Weapon Scoring Systems
• Airborne and Land Based Tracking
• Integrated Work Stations

c-UAS INTEGRATED SOLUTIONS
The pairing of Moog’s specialized video-tracking capabilities to a variety of field-proven sensor technologies to detect, track, identify and interdict (as jurisdictions permit) potential UAS threats offers our customers a customized c-UAS solution. Sensor technologies include 3D Radars, RF Sensors, Laser Range Finders, and RF/GPS Disruptors.

BORDER/Critical INFRASTRUCTURE security solutions
Moog solutions are engineered to meet the challenges of terrain, climate, and target characteristic/type. A layered surveillance approach yields the highest success rate, combining unattended ground sensors, ground-based radar and remote thermal imaging. To minimize unwanted oversight or detection by threat; rapid, easy deployment is important and reduces the potential of destruction.

1 Cameras (long range visible and thermal)
2 Positioners/Rugged Pan and Tilts
3 Asset Protection Surveillance Cameras
4 Power Supplies
5 Wireless Capabilities
6 Radar
SEA

SURFACE SHIP WEAPONS

Moog is a leading supplier delivering high-precision motion control and electronic solutions to many of the world’s naval forces.

Comprehensive systems are engineered to perform reliably in the harshest of marine environments, providing the long-life and dependability our customers require. Extending our customers’ investments even further is the scalability and upgradeability designed into every component and system along with through life support. Many of Moog’s precision technologies are integrated into littoral and blue water ships. On-board these ships, Moog’s premier electromechanical turret drive actuation, stabilization and slip ring technologies are incorporated into various weapon platforms.

Moog also provides tactical air navigation and surveillance systems, as well as components for network communications, and servocontrols that stabilize the entire ship.

MULTI-AXIS AMMUNITION HANDLING

Moog heritage is responsible for the design, manufacture and integration of precision ammunition handling systems for a variety of applications including naval gun ammunition. Our ammunition handling systems involve complex mechanical integration, linear and rotary actuation and sophisticated, ruggedized motor control technologies.

BAE Systems’ Mark 8 Mod 1 Naval gun: Moog provides the high performance motors for aiming stabilization and ammunition loading. The slip ring transfers power and data.

Rheinmetall’s MLG27 naval gun mount: Moog provides the electric gun/turret drives, motion sensors along with the power and stabilization electronics. The slip ring transfers power and data.

See Moog technology in action. Follow the link below to see multi-axis Ammunition Handling Technology used on the Type 23 Frigate by the Royal and Chilean Navies. This ship features the Mk8, Mod 1, 4.5” gun with Moog ammunition handling drives.

www.moog.com/shipweapons
Moog is a major supplier of hydraulic, electromechanical and pneumatic motion control systems for submarines, aircraft carriers, and other naval vessels. The company has designed and manufactured hundreds of critical control systems that operate valves, open and lock hatches and provide propulsion for these platforms.

SUBMARINE ACTUATION

Moog’s legacy supplying actuation in U.S. Navy submarines extends more than 50 years, from the USS George Washington-class all the way to today’s USS Virginia-class and the future Columbia-class.

Moog actuation is also found in mission critical surface ship applications such as the propulsion plants of both USS Nimitz and USS Gerald R Ford-class aircraft carriers.

AUTONOMOUS UNDERSEA VEHICLE PROPULSION AND CONTROLS

For ROV and AUV platforms Moog provides motors, controllers, actuators, servovalves, and sonar equipment and is making investments in future technologies to support these platforms. Moog has facilities in the United States, Canada, United Kingdom, Germany, and Australia dedicated to the naval and marine industries. If your application is in a challenging environment where performance really matters, Moog has the reliable, low-risk solution to ensure mission success and provide propulsion for these platforms.