SPACE

REVOLUTIONIZING THE WAY TO SPACE
PROPULSION
Moog provides components and subsystems for cold gas, chemical, and electric propulsion and designs, develops, and manufactures complete chemical propulsion systems, including tanks, to accelerate the spacecraft for orbit-insertion, station keeping, or attitude control. Moog makes thrusters from <1N to 500N to support the propulsion requirements for small to large spacecraft.

AVIONICS
Moog is a proven provider of high performance and reliable space-rated avionics hardware and software for command and data handling, power distribution, payload processing, memory, GPS receivers, motor controllers, and onboard computing.

POWER SYSTEMS
Moog leverages its proven spacecraft avionics and high-power control systems to supply hardware for telemetry, as well as solar array and battery power management and switching. Applications include bus line power to valves, motors, torque rods, and other end effectors. Moog has developed products for Power Management and Distribution (PMAD) Systems, such as high-power DC converters, switching, and power stabilization.

MECHANISMS
Moog has produced spacecraft motion control products for more than 50 years, dating back to the historic Apollo and Pioneer programs. Today, we offer rotary, linear, and specialized mechanisms for spacecraft motion control needs. Moog is a world-class manufacturer of solar array drives, propulsion positioning gimbals, electric propulsion gimbals, antenna positioner mechanisms, docking and release mechanisms, and specialty payload positioners.

STRUCTURES, SHOCK AND VIBRATION CONTROL
Moog provides a variety of vibration suppression and launch infrastructure hardware for large and small satellites, including our patented SoftRide products, and our COTS ShockWave isolators; we offer a variety of payload adapters for satellite rideshare, including a family developed around the popular ESPA ring.
SPACE VEHICLES

SMALL LAUNCH ORBITAL MANEUVERING VEHICLE (SL-OMV)
The Small Launch Orbital Maneuvering Vehicle (SL-OMV) is a propulsive tug for secondary payload deployment. The SL-OMV is designed to launch on Venture Class Launch Vehicles (VCL-V) with a capacity of 150 kg or greater including spaceport-based systems. It is payload configurable for cubesats through ESPA-Class spacecraft. It can be used to disperse cubesat constellations or deliver ESPA-Class spacecraft to their ideal orbit. The SL-OMV has its own avionics, power, green propulsion, and communications systems that are configurable for short duration missions.

COMET
The COMET is a propulsive tug for secondary payload deployment based on the Moog ESPA ring. It is designed to launch on National Security Space Launch (NSSL-class) Vehicles, supporting up to 1,500 kg of secondary payloads. The COMET can be used to disperse small satellite constellations, act as a hosted payload platform, or deliver a single spacecraft to its ideal orbit.

METEOR PLUS
The METEOR Plus is a high-power, long-duration variant of COMET for missions to geosynchronous orbit (GEO) and beyond. It features a customizable ESPA Grande using ports or four point mounts hosting payloads up to a total of 1 kW and 1,000 kg.

ASTRO
The ASTRO is a High Delta-V variant of the OMV to enable geostationary transfer orbit (GTO) to GEO or deep space missions. The ASTRO baselines a dual-mode hydrazine/nitrogen tetroxide (NTO) propulsion system. The ASTRO is designed for launch on NSSL-class vehicles and can support up to 700 kg of port-mounted payload.

SMALL SATELLITE PLATFORM
The Small Satellite Platform family leverages several of the subsystems from METEOR but is in a smaller form factor. It hosts payloads up to a total of 500 W and 200 kg.
Moog is a provider of precision fluid and motion control and vibration and shock isolation solutions for traditional and new space applications. We have served the global space access market since the 1950s with the original Moog hydraulic servovalve. From small launchers to NASA’s Space Launch System, which is the most powerful rocket ever built, our team has extensive experience to design, develop, and manufacture your components, subsystems, and integrated systems that will assist your journey to space.

**ACTUATION**
Moog is a premier provider of motion control products and systems in the space access marketplace. We offer Electrohydraulic (EH), Electromechanical (EM), and Electrohydrostatic (EHA) actuation technologies for thrust vector, fin, flap, and engine controls for launchers and space planes.

**PROPULSION**
Moog is an expert in earth-storable and cryogenic propulsion components and systems. A world-class provider of fluid and pneumatic controls providing pressure and flow control for thrusters and engines, we also provide thrusters, thruster modules, and systems for roll control applications.

**AVIONICS AND POWER SYSTEMS**
Moog provides processors, control cards, control systems, and high power control for difficult space access environments. Control electronics are designed, developed, and manufactured for actuation and mechanisms, data acquisition engine and propulsion controls, guidance and navigation, ordnance, and power distribution and management.

**SHOCK AND VIBRATION CONTROL**
We provide isolation for launchers to ensure successful launch and delivery of space payloads. Moog’s SoftRide coupling technology is tuned for each combination of launch vehicle and payload to ensure optimal performance while remaining compatible with attitude control systems. Products significantly reduce launch environments and allow more of the mass of spacecrafts to support on-orbit functions rather than launch survival.

**ESPA**
ESPA is an industry standard for small satellite rideshare. It has also been used as a satellite bus, a constellation deployment dispenser, and a hosted payload platform. Moog can tailor ESPA per mission requirements, including modifying the number and size of secondary ports, adding mounting pads, and/or modifying the Ring height.
HUMAN EXPLORATION

Moog technology is radiation-hardened to play critical roles in power conversion and management, data control and handling, and much more, enabling human exploration to the Moon, Mars, and beyond. Moog stands the test of time, as our hardware has supported human operations on the International Space Station for more than 20 years. Current plans are to extend that human presence from low Earth orbit to the lunar surface. Our propulsion technology will be critical to supporting operations on the lunar surface, as it has already been selected for several landers as part of NASA’s Commercial Lunar Payload Services Program.

ENVIRONMENTAL SYSTEMS

Moog valves, regulators, and quick disconnects facilitate the delivery of life-sustaining resources like oxygen, nitrogen, and water to support breathing air and removal of waste from crew capsules and living quarters. The Moog expertise in this area, from components to full systems, delivers these life-sustaining resources to crewed rovers, surface habitats, and deep space where humans will one day have a permanent presence.

AUTOMATION AND MACHINE LEARNING

Our autonomous technology, combined with Moog actuation systems and fluid transfer elements, has a proven performance history allowing crew capsules to dock with large in-space assemblies, like the International Space Station and Gateway in the future. Moog’s continued investment into automated technologies and their use on several types of vehicles illustrates our prioritization of this technology and what it means to live and work on the lunar and Martian surfaces.

ELECTRIFICATION

Moog offers electric motors, mechanisms, and actuators that enable platforms and vehicles to transform into fully electric systems. We combine this with our radiation-hardened computing, control systems, and power management and distribution, along with system integration capabilities, to be a partner in creating electric platforms needed for a sustainable lunar presence.

POWER MANAGEMENT AND CONVERSION

Solar and fission technologies will likely provide much of the power needed to sustainably live and work on the lunar and Martian surfaces. Moog is developing industry-leading efficient (above 95%) high-power voltage converters and distribution systems for deep space applications.
Moog designs and manufactures components and systems to survive the harsh environments of space travel. An industry leader in space avionics, actuation and mechanisms, propulsion, power, structures, and shock and vibration control, Moog has been committed to the space industry for more than 60 years. For future space missions, Moog is investing significant resources into propulsion test facilities, metal additive manufacturing, rad-hardened avionics, and innovative in-orbit servicing vehicles.

DID YOU KNOW THAT MOOG HAS TRAVELED TO EVERY PLANET?

Moog hardware flies on thousands of Earth orbiting spacecraft that are not shown on this infographic.