Advanced Manufacturing,
Sustaining Engineering
and Logistics Services
With over 65 years of experience, Moog Inc. is best known as a worldwide designer, manufacturer, and integrator of precision motion control products and systems. While very proud of the core business that we’ve built, our capabilities go well beyond servo-valves and hydraulic actuation – expanding to cold spray repair, additive manufacturing, integrated logistics services, reverse engineering and more, and benefitting military and commercial aircraft customers, defense manufacturers and other industries.

**Additive Manufacturing**

Metal additive manufacturing is the process of building components directly from powder by successively bonding layer after layer of powdered metal at exactly the points defined by digital 3D CAD design data. With the proper design, material selection and machine setting, parts can be created with high accuracy, detailed resolution, and excellent mechanical properties. This allows the manufacture of parts with complex geometries that could not be made using traditional methods and allows multi-part assembling to be printed in a single part.

**Reverse Engineering**

Many legacy aircraft have obsolescence issues with parts or suppliers that are no longer in business. Don’t let these challenges keep you grounded or slow your manufacturing operations. Our seasoned engineers have the talent and expertise to solve obsolescence issues and are backed by quick reaction machine shops to ensure hardware goes from drawing to production in time to meet your schedule.

**Cold Spray Repair**

Our comprehensive cold spray repair services provide manufacturers and end users an economical repair solution for corroded and damaged parts. Using an advanced additive manufacturing process for metal surfaces that does not induce thermal stresses into the parent or deposited material, cold sprays unique properties are compatible with many aerospace materials. The low or high pressure system options allow application of lighter materials or enhanced capabilities to provide dramatic improvements in process characteristics and performance.

**Integrated Logistics Services**

We provide highly responsive, customer-focused support to commercial and military operations around the world. Additionally, we offer modification and upgrades, obsolescence management, logistics services, technical support and training, and public-private partnerships. Over the last two decades, we have extended our world-class support to include both Moog and non-Moog parts, and provide comprehensive logistics services for a wide range of mechanical, hydraulic and electronic parts.
Additive Manufacturing

Additive Manufacturing (AM) enables engineers to design parts that could not be made using traditional methods, including those with complex features or multi-part assemblies. It also allows engineers to design less expensive parts that can be available in days versus weeks. Leveraging our acquisition of Linear Mold and Engineering and their years of experience we easily facilitate:

- Design
- Production
- Inspection
- Post Processing

The Process

Metal additive manufacturing is the process of building components directly from powder by successively bonding layer after layer of powder metal at exactly the points defined by digital 3D CAD design data. With the proper design, material selection and machine setting, parts can be created with high accuracy, detailed resolution, and excellent mechanical properties. Linear Mold and Engineering, a Moog company, has more than a decade of design and manufacturing expertise for aircraft, space, defense, energy and medical applications.

Design Excellence

Additive manufacturing technology will help you achieve enhanced product features such as lighter weight and complex shapes and designs. Additional benefits are improvement in performance and reliability, realization of reduced part counts, reduction of lead times, and simplification of supply chain. The ability to work in a variety of materials including Aluminum, Titanium, Cobalt Chrome, Inconel®, Maraging steel, Stainless steel, Hastelloy® X-alloy and more provides maximum flexibility.
Reverse Engineering

Moog is qualified and experienced in the reverse engineering of aerospace systems, subsystems and components. We design, develop, fabricate and qualify critical aerospace products, with successful outcomes for over 65 years. Our technologies include hydraulic, mechanical and electronics, encompassing:

- Metallurgical lab testing and analysis
- Fabrication/manufacturing
- Heat treat and wet processing testing
- Environmental and assembly testing

Supportability Issue Resolution

Reverse engineering is critical to resolving support issues that plague aging aircraft – including product obsolescence, vanished suppliers and the challenges of working with high cost, sole-source OEM’s that struggle to deliver parts on schedule. In addition to replicating existing designs, reverse engineering often provides the opportunity to improve the product – leading to a longer lasting, more producible product that reduces overall maintenance and operation costs.

Proven and Successful Process

With a proven and successful process for the reconstruction of the essential design data required to reverse engineer, manufacture, and qualify mechanical, electrical, and hydraulic components; our extensive design expertise enables us to support the more challenging flight-critical aircraft components, duplicating the items both functionally and dimensionally.
Cold spray is an innovative repair solution utilizing additive manufacturing, a process that uses metal powders accelerated to supersonic speeds to restore the original substrate without inducing thermal stresses. This process is being widely used in the automotive and industrial marketplaces and is ideal for aerospace materials like:

- Magnesium
- Aluminum
- Titanium
- Other alloys

The Ideal Solution

Cold spray is ideal for many situations, including repairing and preventing corrosion damage, recovering mis-machined parts, improving wear resistance, restoring worn/damaged features, surface build up and more. Cold spray repair is generally performed using low or high pressure systems, through the use of a handheld, portable system or a programmed robotic system in a ventilated work chamber.

A System to Fit Your Needs

Low pressure systems are used in the application of lighter materials, and are typically much smaller, portable, and limited to 300-600 m/sec particle velocities. These systems are best used to repair minor surface defects, blemishes, etc.

High pressure systems provide significantly enhanced capabilities, enabling the use of additional materials and providing dramatic improvements in process characteristics and performance. This system is stationary and utilizes higher pressure gases, typically generating particle velocities of 800-1400 m/sec, and used for more complex repairs and/or where increased deposition adhesion and elongation properties are required.
Integrated Logistics Services

With facilities, suppliers and customers spanning the globe, we have the expertise to manage your global logistics operations to ensure the right parts are in the right place at the right time. Our services include:

- Turnkey MRO
- Supply chain management
- Warehousing services and inventory management
- Import/export control and compliance

Comprehensive, Proven Logistics Services

We provide comprehensive logistics services for all fleet requirements, including tip-to-tail solutions. Our world class sustainment organization has been providing support to the US DOD and international customers for over 65 years. With a wide range of flexible and cost-effective services to ensure your entire fleet is maintained at a high readiness level, our dedicated customer-focused team takes pride in developing tailored support programs to fit your needs.

Repair and Overhaul

Cost effective alternatives to challenging repair and overhaul issues is our specialty. Support covers all Moog legacy hardware as well as non-Moog products. In addition, our established supply chain allows us to provide high quality, cost-effective solutions to operators and maintenance facilities around the world, while our import/export control and compliance team ensures efficient product delivery to the end user.