Moog Wins Contract Award with Embraer for Flight Control System on Second Generation of E-Jets

Moog was selected by Embraer S.A. to supply the Primary Flight Control System for Embraer’s second-generation E-Jet family. Under the contract, Moog will provide design, qualification and certification support for a three-axis integrated Primary Flight Control System including Moog proprietary flight control computers and software, flight control actuators and related control electronics.

Provisionally outlined with 78 to 122 seats, the new aircraft will succeed the current E-170 and E-190 lines and is scheduled to enter service in 2018. The new family will be reconfigured with an all-new wing, full fly-by-wire flight control systems and extended main landing gear to provide more clearance for new, higher bypass engines.

Bell Selects Moog to Provide Integrated Flight Control System for the V-280 Valor™

Moog was selected by Bell Helicopter to design, manufacture and qualify an integrated flight control system, consisting of flight control computers, support software and flight control actuation, for the Bell V-280 Valor, Bell’s third generation tiltrotor.

With a combination of range, speed and combat capability, the Bell V-280 will offer U.S. Army commanders a combat maneuver platform with unmatched operational agility to self-deploy and perform a multitude of vertical lift missions, making this key program the most operationally effective aircraft for the U.S. Army’s Future Vertical Lift requirements.
Moog Supplying Primary Flight Control Actuation and Trailing Edge Actuation Systems for Airbus A350 XWB

Moog was selected by Airbus to provide design, integration and certification support for the Primary Flight Control Actuation on the A350 XWB. Moog is providing 29 discrete actuators and associated control electronics on this program. This system includes a mix of electrohydraulic (EH) and advanced electrohydraulic (EHA) actuators to control the aileron, elevator, rudder and spoiler flight surfaces. Moog’s products feature:

- More electric actuation technology
- Onboard electronics for actuator power and control
- Highly integrated assemblies to meet challenging envelope constraints

Moog was also selected to supply the Trailing Edge Actuation System for the A350 XWB including the power control unit, inboard and outboard geared rotary actuators, gearboxes, wing tip brakes and other miscellaneous components.

Moog Providing Flight Control Computer and Software for 747-8

Moog is supplying Boeing with the lateral control electronics (LCE) for the new Boeing 747-8. The Boeing 747-8 Intercontinental and the 747-8 Freighter are the new high-capacity 747s, which recently entered revenue operations.

As part of the program, Moog designed, manufactured, qualified and provided certification support for the LCE. The function of the LCE is the control of fly-by-wire aileron and spoiler actuators.

The system leverages Moog’s proprietary dual redundant, triplex dissimilar architecture and builds upon expertise gained designing and certifying flight control systems on other civil programs.

System Provider for 787 Primary Flight Control and High Lift Actuation

Moog is the system integrator for the 787 Primary Flight Control Actuation System (PFCAS) and the High Lift System. Moog provided the design, integration and certification support for both of these systems. The Moog systems control the primary, secondary and high lift surfaces in response to pilot commands.

The 787 PFCAS System controls 21 flight surfaces and includes a mix of electrohydraulic (EH) and electromechanical (EM) servoactuators and all associated control electronics. The system includes EH servoactuators with remote loop closure electronics for the ailerons, flaperons, inboard and outboard spoilers, elevator and rudder. The horizontal stabilizer and mid-board spoilers employ EM servoactuators with associated motor drive control.

The High Lift System includes the complete Flap and Slat Actuation Systems compromising nearly 450 discrete assemblies including: power drives, electronic controls, trim controls, geared rotary actuators, rack and pinion roller assemblies, transmissions shafts, offset gearboxes, sensors and accessory components. The High Lift System features a number of technical advancements to improve wing aerodynamics. To decrease system weight, a number of advancements were also incorporated, including the use of advanced composites and increased use of electronic controls.
Moog Supplies Integrated Flight Control System for Gulfstream G280

Moog was selected by Gulfstream Aerospace, a wholly owned subsidiary of General Dynamics, to supply an integrated flight control system for the G280 business jet. Moog was awarded all flight control design packages for the airplane including flight control computers, primary and secondary flight control actuation, flap drive actuation and horizontal stabilizer trim.

Moog’s architecture allows common functions to be integrated, allowing for a net reduction in line replaceable units, system weight and size, while maintaining or exceeding requirements for performance and reliability. Moog also provided integration and certification support for the G280, which recently received FAA/EASA type certification.

Moog Selected for COMAC C919 High Lift System

Moog and the Commercial Aircraft Corporation of China (COMAC) recently signed a contract for the development of the High Lift System for the C919; COMAC’s new narrow body commercial transport. The High Lift System includes all flap and slat actuation, pilot interfaces, electronic controls, power drive units, wing tip brakes, gearboxes and miscellaneous components.

Moog has been working with COMAC in the joint development phase of the High Lift System including such activities as architecture definition, design trade-off analysis, preliminary hardware designs and hardware volume integration. The formal joint concept definition phase was completed last year.

COMAC has forecasted a global market for more than 2,000 C919 aircraft over the 20 years following entry into service, currently planned for 2016.

Bell Helicopter Selects Moog for Bell 525 Relentless Flight Controls

Bell Helicopter selected Moog to provide the design, qualification and manufacturing of the primary flight control actuation for the new Bell 525 Relentless helicopter. The helicopter’s flight control system will feature a new fly-by-wire architecture. Earlier this year, Moog completed the critical design review and delivered the first shipset of prototype hardware.

In February 2011, Bell Helicopter launched the 525 Relentless Program, a Super Medium™ twin capable of carrying up to 16 passengers. The helicopter, which was designed with the assistance of select customers, will be marketed to the offshore oil industry, search and rescue operators, corporate/executive transport and emergency medical operations.

Moog Supplies High Lift System for Gulfstream G650

Moog has been a long-term supplier to Gulfstream, having supplied flap drive actuation solutions since the mid 1970s. Following on the heels of the win on the G280, Gulfstream again selected Moog to design, integrate and manufacture the Flap Drive System for their largest, long-range business jet, the G650.

The Moog system includes flap actuation, control electronics and software, pilot interfaces, power drive, transmission components and accessories. Moog provided integration and certification support for the G650, which recently received FAA/EASA type certification.
System Integrator for F-35 Joint Strike Fighter Primary and Leading Edge Flight Controls

Moog is leading an industry team in the development and integration of the Primary Flight Control and Leading Edge Flap Actuation Systems for the Joint Strike Fighter Program. The F-35 “power-by-wire” system represents advancement on the more electric aircraft topology integrating:

- Self-contained electrohydrostatic actuators (EHA) to position primary flight surfaces
- Electronic control units to remotely drive and control the EHAs
- Electrically-driven PDUs to position the maneuvering leading edge flaps

As the prime contract holder, Moog’s role includes management of the industry team, integration of the complete actuation system, and supplier of critical technologies and major subsystems. Moog is also supplying the wingfold actuation system on the F-35 C-variant, and Moog’s Wolverhampton operation is the lead system integrator for the STOVL lift fan and main engine swivel module actuation system.

Supplier of V-22 Primary Flight Control Actuation

Moog is providing the design, manufacture and integration of 19 primary flight control actuators including the main rotor swashplate, flaperon, rudder and elevator.

In addition, Moog is providing the active vibration control system, bladefold actuation, nose-wheel steering servovalves, main prop rotor slip ring, hydraulic fluid compensation module and engine fuel control servovalves. Key attributes of the flight control system include a 5000 psi operating pressure, duplex hydraulic – triplex electrical redundancy on the Swashplate actuators and ballistic tolerant elevator and swashplate actuators.

Systems Integrator for X-47B Primary Flight Control Systems

Moog is the Primary Flight Control Actuation Systems Integrator for Northrop Grumman’s X-47B unmanned combat air system. The system includes a fully redundant architecture featuring multifunction system controllers and modular electrohydraulic (EH) actuators. The system controller features a high speed 1394 bus interface, redundancy management, and full digital closed loop control for all flight surfaces and advanced vehicle functionality. The high dynamic dual tandem EH actuators position the Aileron, Elevon and Spoiler flight control surfaces.

Supplier of A400M Primary Flight Control Actuation

Moog is providing the design, manufacture and integration of eight fly-by-wire servoactuators for the Airbus A400M primary flight control surfaces. Moog is supplying electrohydraulic (EH) actuators for the aileron, elevator and certain spoiler surfaces and electric backup hydraulic actuators (EBHA) for positioning other spoiler panels. The EBHA includes a self-contained electrohydrostatic actuator (EHA) with integral pump and electronic controls. During normal operation, the EBHA operates as a conventional EH actuator using the aircraft’s main or backup hydraulic systems. When in backup mode, the onboard pump and controller provide hydraulic power for positioning the spoiler surfaces, allowing the elimination of the third hydraulic channel.
Moog Supplies Lift Fan and Swivel Module Actuation Systems for F-35B STOVL

The F-35B is a Short Take-Off and Vertical Landing (STOVL) variant of the Joint Strike Fighter. The “hovering” ability of this distinctive aircraft is provided through a combination of a thrust vectoring nozzle directing main engine exhaust downward to generate aft vertical lift, and a centrally mounted lift fan which provides counterbalancing forward vertical lift. Moog designed, qualified and now manufactures the sophisticated actuation systems for both of these applications. Specifically, Moog supplies the actuation system for the three-bearing swivel nozzle which rotates the main engine’s exhaust downward through 90 degrees. In addition, Moog provides the actuation system controlling the lift fan’s variable area nozzle and inlet guide vane which control airflow through the lift fan. These actuation systems use electronically-controlled hydraulic and fuel/strut actuators specially designed for operation in extreme temperature and vibration environments.

Supplier of Primary Flight Control Actuation for AW159

The AW159 Lynx Wildcat is a modern twin engine, multi-role helicopter designed for battlefield utility, search and rescue and anti-submarine warfare roles with the British Army and Royal Navy. Moog was selected by AgustaWestland to design, qualify and manufacture the tail rotor actuator for this aircraft. Moog’s actuator directly interfaces with the helicopter’s automatic flight control system, allowing the aircraft to be flown on autopilot. First flight occurred in November 2009 and initial production deliveries are underway.

Moog Supplies Primary Flight Control Actuation for M346

The M346 is Europe’s first fly-by-wire jet trainer with transonic capability. Aermacchi selected what is now Moog’s Wolverhampton operation to design, qualify and manufacture the Primary Flight Control Actuation for this advanced jet trainer. Moog’s system controls all primary flight control surfaces including ailerons, rudder and horizontal tail. The fly-by-wire system includes quadruplex redundancy and leverages direct drive valve technology for optimal reliability.

Moog Selected to Provide Actuation System for Boeing Next-Generation KC-46 Tanker

Moog was selected by Boeing to provide the refueling boom actuation system on the KC-46 aircraft. In 2011, the United States Air Force selected Boeing to build the next generation KC-46 aerial refueling tanker to replace 179 of the service’s 400 KC-135 tankers.

Moog will provide the design, integration and qualification of the complete actuation system used to extend, retract and guide the refueling boom during in-flight refueling operations. Moog’s system will include fly-by-wire actuators to provide precision control of the boom’s rudder and elevator flight surfaces. Moog will also provide the telescoping and hoist actuators used to extend and retract the entire boom.
Moog Crossbow Offers Affordable MEMS GPS/IMU Solutions

The Moog Crossbow NAV440 is an integrated GPS and Attitude & Heading Reference System (AHRS) that utilizes low drift MEMS-based inertial sensors with GPS aiding to provide an unmatched price and performance. Developed in response to years of extensive application experience in a wide variety of airborne, marine and land applications, the NAV440 also incorporates many new and enhanced design features. Typical applications include navigation, control and stabilization in marine and land environments.

Product Features:
- Complete GPS-Aided AHRS Solution
- Accuracy < 0.2 deg
- Output Data Rate > 100Hz
- WAAS and EGNOS Enabled GPS
- Low Power < 4W
- Rugged Sealed Enclosure

Moog Integrated Gimbal Axis Assemblies

Moog Components Group provides innovative solutions for applications that require gimbal actuation. As the aerospace and defense industries continue to expand the limits of high performance, reliability and compact product designs, we offer higher level solutions that maximize performance of individual components and integrate them into an efficient packaged option.

This assembly is used to rotate each axis of gimbal assembly for precise pointing and tracking. Integrated gimbal axis assemblies must be compact, lightweight, provide high torque and resolution with high stiffness and minimal friction to meet performance objectives over wide temperature ranges. They typically use direct drive torque motors and include slip rings to transfer data and power. Moog’s capability to provide and integrated assembly is built on a legacy of working with customers on numerous successful programs.

Active Vibration Control Systems for Military and Civil Rotorcraft

Moog is supplying active vibration controls for Sikorsky’s UH-60M Blackhawk helicopter. Moog’s Vibration Suppression Actuation System (VSAS) includes a DSP-based controller and a pair of counter-rotating force generators per channel. Vibration levels within the air vehicle are monitored and the force generators inject cancellation forces at discrete locations throughout the airframe, dynamically adapting to changes in the vibration environment. By eliminating the need for heavy passive vibration absorbers, the system offers weight savings while providing a number of secondary benefits including enhanced situational awareness, passenger comfort and increased aircraft component life. The system is currently flying aboard the Sikorsky S-92, Bell/Boeing V-22, UH-60 Blackhawk, SH-60 Seahawk and Sikorsky’s X2 technology demonstrator.

Advanced Electronic Controls for Aerospace and Defense

Moog is a leading supplier of electronic controls for mission critical applications in the aerospace and defense industry. Our state-of-the-art systems are used wherever precision control is required, including aircraft flight control, launch vehicle thrust vector control, aiming and stabilization, and missile steering. Our expertise includes advanced digital control, distributed system architectures, high power drives, redundancy management and designs for harsh environments. We have designed, qualified and provided certification support to civil and military level A standards. Our products are well-suited for both OEM and product upgrade programs.
Critical Control Solutions for Aerospace

Connectors with Integrated Fiber Optic Components

Moog now has a line of high performance fiber optic transmitter and receiver components that are integrated with an optic plug connector. The Sabre series is a multimode optical fiber interface that supports applications where copper cable link distance, bandwidth, weight or bulk make the use of twisted pair, twinax or quadax copper conductors unacceptable. The Sabre series allows for high speed network communications over long distances in harsh environments.

Product Features:
- Operating temperatures from -55°C to +85°C
- Shock and vibration resistant
- Meets stringent corrosion performance specifications

Moog Crossbow Fiber Optic Vertical Gyro Supports Critical Aircraft Navigation and Guidance Applications

The VG700MB is a MIL-Qualified vertical gyro used for measuring roll, pitch and heading angles in dynamic environments. VG700MB applications include avionics, platform stabilization, land vehicle guidance, and control of sophisticated robotic systems. Moog Crossbow has fielded thousands of systems worldwide for use by the US DOD and Coalition Forces. Major customers include the IAI family of Searcher, Hunter, and Heron family of Unmanned Aircraft which utilize the VG700MB for primary navigation and control.

The VG700MB incorporates Moog Crossbow’s third generation Fiber Optic Rate Gyro technology providing superior performance, reliability, and long term stability.

Product Features:
- MIL-Qualified Vertical Gyro
- Fiber Optic Gyro Stability < 20°/hr
- Stabilized Roll and Pitch Angle Outputs
- Optional Relative Heading Output (206 Model)
- Environmentally Sealed Enclosure
- MIL-STD-810E, MIL-STD-461D

Moog Crossbow Introduces New Card-Level MEMS-Based Attitude Heading and Reference System (AHRS)

The ANAV200 is Moog Crossbow’s most compact, card-level MEMS GPS-aided AHRS for embedded use within integrated navigation and guidance systems. The ANAV200 has a small footprint volume of only 7 cubic inches and weighs less than 80 grams. Example applications include UAV flight control, SATCOM on the move, land vehicle and missile guidance, platform stabilization and micro-robotics.

Product Features:
- High reliability MEMS sensors
- High range sensor option available
- High accuracy < 0.2°
- Small form factor < 7in3
- Low power < 1W
- Lightweight < 80 grams
- External SAASM GPS and integral 3-axis solid state magnetometer interface

Rotary and Linear Electromechanical Actuators and Controls

Moog leads the industry by designing and producing high-performance linear and rotary electromechanical actuators (EMA) for aerospace and defense applications. Our actuation products are used to control flight surfaces and position sensors on aircraft, missiles and space vehicles; provide stabilization and aiming for land and sea based gun turrets; steer antennas in high bandwidth communication systems; and provide control for various utility applications.

Moog is able to offer precision actuation solutions with rare earth brushless motors, planetary gears and smart servo controllers with integral position control or utility actuation solutions with DC motors, spur gears and analog amplifiers with external position control.

A technology initiative currently underway allows us to offer a fiber optic communication interface for our EMAs. This technology provides many systems advantages, including EMI immunity and weight savings.
Moog Concludes Successful Flight Tests of Stores Management System

Moog completed successful flight demonstrations for the Third Generation (G3) Stores Management System (SMS) at the U.S. Army Yuma Proving Grounds. The testing occurred during week of 3-9 March 2013.

The G3 SMS is a super lightweight system (sub 4lbs), capable of a variety of communication protocols, able to perform sensor-seeker slave and perform real-time launch acceptability regions for precision weapons. The G3 is the first off-the-shelf SMS to be fully compatible with Lockheed Martin’s HELLFIRE® AGM-114 Romeo missile. The system was integrated onto both an MD-500 and Cessna C-208 aircraft in less than 3 weeks and flew over 12 sorties and conducted over 35 target engagements against a variety of fixed targets.

The SMS flight demonstrations were supported by employees from Moog’s newly formed Integrated Defense Systems (IDS) business. The business focuses on Moog’s capabilities in the integration of complex weapons systems for either newly manufactured or existing assets. Moog and its partners will function as an agile prime in support of OEMs who seek rapid, high-value solutions for integrating complex weapons systems on board fixed-wing, rotary-wing, naval or land-based platforms regardless of quantities. Moog’s demonstrated track record in weapons stores management will serve as a critical cornerstone to accelerate various modular weapon solutions for both domestic and international clients who seek rapid delivery, low cost and proven engineering design.

Moog Provides Propulsion, ESPA Dispenser in ORBCOMM’s Second Generation OG2 Constellation

Moog ISP propulsion systems are being used for the ORBCOMM second generation OG2 constellation. The propulsion system is based on Moog ISP’s MONARC-1 monopropellant engine and aluminum rolling metal diaphragm propellant tank. Moog ISP was responsible for the design, assembly and test of the systems. Eight systems launched on a SpaceX Falcon 9 v1.1 using two Moog ESPA rings in late 2013 with the remainder to follow in 2014.

Moog CSA Engineering is providing the ESPA rings as part of a modular satellite dispenser. The dispenser will also feature Moog CSA’s SoftRide isolation of the launch stack. Once delivery is complete, Moog engineers will go on site to work with ORBCOMM and its launch partners to integrate the satellites, rings and rocket.

ORBCOMM’s machine-to-machine (M2M) solutions provide cost-effective tracking, global asset monitoring and messaging services through its Low Earth Orbit (LEO) satellite constellation. The launch of the new Generation 2 (OG2) satellites will upgrade and expand the satellite network.

Motion Control Technology for Defense and Security

Moog designs, manufactures and integrates motion control systems and components for military vehicle platforms. Moog’s expertise in stabilization, fire control, weapons integration, power distribution and management, data acquisition and management and C41 systems can be found on more than 30 of the world’s leading military ground vehicle platforms.

Moog builds its systems from heritage components designed and manufactured in-house. Key components include:

- Gun controllers
- Electromechanical and electrohydraulic actuators
- Single to multiple axis controllers
- Fire control computers
- Power management units
- Slip rings
- Fiber optic multiplexers
Moog Delivers 100th MM-7000 TACAN System

The Moog Navigation and Surveillance SLC team celebrated the delivery of the 100th MM-7000 TACAN system on December 11, 2013. The Award was presented by Executive GM John Willey to R&D Director Achim Soelter, Engineering Manager George Weida and Principal Engineer Steve Call, representing the entire SLC-based team for the project. The MM-7000 represents Moog’s platform-based TACAN, and was developed specifically to meet more stringent technical requirements by Customers including the U.S. Navy, and other allied nations worldwide. The state of the art platform approach enables the system to be configured to meet requirements ranging from man-portable through shipboard, all with unsurpassed accuracy and reliability. Interchangeable LRUs are a key platform component, allowing ready commonality of parts and spares regardless of system purchased. Moog is proud to be the world leader in TACAN innovation, low cost and reliability, offering both the MM-7000 platform system and the 2010 TACAN system, as well as modern DME and DF choices.

Moog’s Market Leading Systems Include the 2010 TACAN

Moog is the number one TACAN producer on the market today, having sold and fielded more systems than all other TACAN suppliers combined. The 2010 TACAN has set new standards to meet the increasing demands for low life cycle costs, greater reliability, performance and control. Use of the latest technology and more dependable components has set new standards in reliability and maintainability. The 2010 TACAN is available in single and dual configurations for fixed and deployable applications. The 2010 TACAN is now deployed throughout the world to customers including the US Air Force, NATO, and key Air Forces and Navies in the UK, Europe, Middle and Far East.

Distance Measuring Equipment (DME)

Moog’s 2020 DME is one of the world’s most technologically advanced distance measuring equipment available today. Solid state features include DSP technology, hardware monitoring and conservatively rated RF power amplifiers. It can be quickly and inexpensively reconfigured or repackaged to meet fixed base and mobile system requirements in a variety of configurations that include single or dual transponder, as well as a compact wall mounted version. The 2020 DME can be operated independently or in conjunction with other navigational aids. Moog’s DME technology innovation yields significant costs savings from greater reliability, serviceability and reduced life cycle costs.

US Navy Selects Moog to Supply Shipboard and Shore-Based TACAN Upgrades

Moog has been selected by two divisions of the US Navy to redesign and upgrade legacy URN-25 (URN-32 or MM-7000) TACAN systems. The US Navy’s Space and Naval Warfare Systems Center in San Diego, California awarded Moog a contract to upgrade shore-based TACAN systems, and the Naval Warfare Center Aircraft Division in Patuxent River, Maryland awarded Moog a contract to upgrade shipboard TACAN systems.

The URN-25 is the first newly designed 21st century Tactical Air Navigation (TACAN) beacon–transponder. The upgrade (URN-32/MM-7000) has a flexible configuration, requiring only half of the existing cabinet space. The TACAN has met all of the requirements set forth by the US Navy, is suitable for fixed-site and shipboard installations, and is compatible with the US Navy’s standard OE-273 antenna and other mechanically rotating TACAN antennas.
Moog Launches EcoKit Remote Power Source for Surveillance Cameras

Moog upgrades the EcoKit, a remote, green-power generator. The new EcoKit offers enhanced system efficiency, allowing a 25% increase in reserve power, and includes a redesigned controller cabinet for simplified installation and system access.

The EcoKit delivers reliable energy at an attractive price point. EcoKit upgrades offer a ruggedized green power generation system which meets the environmental demands of remote surveillance systems.

An EcoKit system was installed and tested during Hurricane Sandy, and was able to withstand hurricane-force winds while remaining fully operational. It is fully compatible with Moog poles, camera enclosures, and wireless systems and provides an excellent turnkey solution for most surveillance applications.

Thermiq™ Technology Combats Heat

The Fusion Camera Housing with Thermiq™ Technology from Moog is engineered to combat heat in today’s IP surveillance cameras. Thermiq Technology keeps cameras closer to ambient temperature. The philosophy is simple: Security cameras are sensitive pieces of electronic hardware, and they run hot. In fact, with compression and faster processors, they run hotter than ever. All of this heat is trapped by cameras, reducing their life span, and lowering their performance. Thermiq Technology opposes heat by using heat diffusers and high speed blowers, a system designed by Moog engineers. Thermiq Technology is available only on Moog Fusion Camera housings, which represent the latest in camera enclosure aesthetics, optics, and ease of installation. In cities, on highways and in hot climates, Thermiq Technology protects expensive surveillance investments.

Moog Rolls Out EXO HD Network Cameras for Harsh Environments

Moog has developed a new line of high-definition (HD) visible and thermal network cameras called the EXO™ Series that can withstand contaminants, chemicals, corrosion, impacts, and flammable gases and dust.

EXO™ Series cameras are available in PTZ, Fixed and Positioner-Based models. PTZ versions include: Corrosion Resistant, Explosion Proof, Vandal Resistant, and Pressurized styles. Fixed models include Vandal-Resistant and Pressurized versions. The EXO GeminEye is a positioner-based camera system with dual HD Visible and thermal camera options for 24/7 surveillance.

The EXO Series is ONVIF-compliant, and depending on the model, ideal for a variety of surveillance tasks including the monitoring of: interstates, urban areas, processing plants, international borders, corporate campuses and oil and gas wells.
Moog Introduces Total Support for Commercial Aircraft

Moog recently launched Moog Total Support (MTS), a comprehensive support program for its flight control systems. By combining asset pooling, maintenance, technical support and logistics, Moog can provide a highly-customized support package that unites its OEM expertise with decades of experience as a world-class MRO provider.

MTS provides airlines with an unrivaled one stop solution tailored specifically to individual needs. This helps to reduce cost, inventory levels, AOG risk and exposure to obsolescence. These flexible life cycle cost solutions include:

- 24/7 access to spares with regional pooling locations around the world
- Guaranteed availability of replacement components
- On-site consignment
- 24/7 customer support
- Lease, loan and exchange options
- Reliability monitoring and maintenance recommendations

Moog Provides A350 Entry Into Service Support

Moog is the designer, manufacturer and integrator for the A350 Primary Flight Control and Flap Drive Actuation. As the aircraft approaches entry into service, Moog is prepared to provide the airlines with industry leading support including expert training from our OEM technical team, first class responsiveness and global spares availability. This includes a team of field service engineers, inventory located in all major world regions, and a variety of spares provisioning and maintenance options.

Moog is working closely with the airlines to customize support packages that meet their exacting needs ranging from initial provisioning buy or lease, access to pool options and flight hour maintenance programs.

Moog Wins Contract with Hainan Airlines for Long Term Support for 787 Fleet

Moog Inc. and Hainan Airlines signed a 10 year exclusive contract for comprehensive support of the Moog Flight Control Systems on Hainan Airlines’ fleet of Boeing 787 aircraft. The program will include maintenance and inventory support via Moog’s strategically selected worldwide stocking locations, giving Hainan 24/7 access to spares no matter where their aircraft are located.

Moog, the provider of both primary and high lift flight control systems on the 787, recently launched an entirely new suite of aftermarket support solutions. The Moog Total Support program is aimed at providing airlines with a comprehensive range of services for Moog products, including inventory support.

Enhanced Services for Commercial Aircraft Operators

Moog recently launched its 24/7 centralized customer service center for our MRO services. The customer center’s dedicated support team provides a single point of contact for all your product support needs.

In addition, Moog recently selected Aeroturbine to provide global logistics support for its Total Support and Asset Support programs. The agreement includes 24/7/365 warehousing for Moog’s global pool support customers. Locations include Miami, Los Angeles, Singapore, Beijing, Tokyo, London and Dubai, with more locations established as required.
Moog Expands H-60/S-70 Flight Control Overhaul and Upgrade Services

Moog developed the capabilities to provide overhaul services for the entire family of integrated trim/boost servoactuator assemblies on the H-60/S-70, including the Pitch Trim, Roll Trim and Yaw Boost Servoactuator configurations. Moog inspects and disassembles the integrated assembly, overhauls and tests the individual LRU’s, and reassembles and tests the integrated assembly before delivery to the customer. Moog has recently won its second consecutive 5-year contract with the US Coast Guard (USCG) to provide overhaul services for their HH-60J/T flight controls, previously demonstrating a 50% improvement in turnaround time while significantly lowering the USCG’s total overhaul cost.

Moog is now offering a reliability upgrade to the UH-60 Blackhawk pitch trim actuator. This upgrade, available exclusively through Moog, will enable the pitch trim to stay on wing longer and provide better performance in harsh climates such as salt water, humidity and sand. A tungsten carbide coating has been added to the booster piston providing additional corrosion and scratch protection. The design of the dust boot has been modified to help keep the pitch trim flying longer and the newly designed mounting feet will prevent corrosion by better allowing the surface to shed moisture. All of these reliability upgrades can be implemented on your current pitch trim through Moog’s exclusive overhaul process.

Moog Expands Global Support Capability for Military Aircraft Products

As part of a recent acquisition, Moog now offers full-service capabilities for the relevant actuation products originally sold under the GE Wolverhampton, Smiths Wolverhampton and Dowty Wolverhampton names. Key products which have been added to Moog’s support capabilities include:

- CN235 – Trailing Edge Flap Actuation & Controls
- Typhoon – Primary Flight Actuation
- A129 – Primary Flight Actuation
- C295 – Trailing Edge Flap Actuation & Controls
- F-35 STOVL – Lift Fan & Swivel Module Actuation
- AMX – Primary Flight Actuation

F-15 Reliability Enhancements to Pitch and Roll Channel Assembly (PRCA)

The PRCA is a critical flight control assembly that provides automatic rati on changing and hydraulic boosting of the pilots commands for aircraft pitch and roll control. The USAF expressed a desire to replace hard chrome plating with an alternative coating that would improve reliability and at the same time mitigate any environmental impact associated with ongoing MRO processes.

Moog’s solution was to identify, prototype and qualify an improved HVOF tungsten carbide piston coating combined with enhanced seal configurations to replace the current chrome plate process. This improved HVOF coating has passed all qualification testing and is currently ready for implementation on new production and R&O PRCA units. The improved coating not only eliminates the chrome strip and replacing requirements during depot overhaul at Hill AFB, but also is anticipated to more than double the seal life in operation. In addition, Moog has redesigned the booster seal glands to a more robust configuration. These improvements will lead to a significant increase in overall PRCA MTBF. The program has been so successful that similar design improvements have been implemented on Moog’s Aileron Rudder Interconnect (ARI) for the F-15. For more information on the F-15 PRCA/ARI Reliability Enhancement please contact Troy Amundson, +63 917 808 8207; tamundson@moog.com

Moog Adds New F-16 Flight Control Support Capabilities

Moog has recently expanded its capability to support F-16 customers with repairs, overhauls and spares for the Leading Edge Flap (LEF) power drive unit (PDU). The PDU is a complex electro-hydro-mechanical system that accurately controls the position of the leading edge flaps in response to changes in aerodynamic conditions.

Moog has also developed internal capabilities to provide cost effective repair and overhaul services for the complete PDU and for all of the subassemblies that make up the PDU. Modifications of older design PDUs into the latest configuration can also be accomplished to minimize support costs for the end user.
Moog Providing F/A-18 C/D Leading Edge Flap System Safety Upgrade for Worldwide Hornet User Community

Moog is the original design authority for the F/A-18 C/D Leading Edge Flap System and has developed and qualified a safety upgrade to improve system reliability, enhance effectiveness of periodic inspections, and ensure control during possible fault condition. The changes include a redesigned torque limiter and stop module and a replacement torque shaft. The upgrades can be installed at the Organizational (O) level and retrofit actions are planned for worldwide distribution in mid-2013.

The changes to the torque limiter include the addition of a brake wear indicator and trip indicator that enable periodic inspection of the brake stack and a means to visually determine whether the torque limiter has experienced a lock-up. The improvements to the stop module control the inboard flap from moving beyond the stroke limits during a run-away, thereby preventing a loss of control condition. Lastly, the torque shaft that connects the hydraulic drive unit to the angle gearbox was redesigned to add a second universal joint, thereby improving shaft support and ensuring any misalignment is handled by the U-Joint.

For more information please contact:
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Moog Expands Sales Coverage for Military Aftermarket Support

Moog recently added three new senior level business managers to its Military Aftermarket Support Organization.

Troy Amundson is joining Moog as a recently retired Commander from the U.S. Navy. He will be responsible for supporting the Asian and Pac-Rim territories, promoting various partnerships related to both Moog and non Moog requirements. Troy can be reached at +63 917 808 8207; tamundson@moog.com.

Hugues Pepratx, who will be supporting the Middle East and North Africa territories, joins Moog with a background focused toward non-Moog applications and services. Hugues will manage various sustainment programs and repair station partnerships throughout the regions. Hugues can be reached at +33 6 27 93 25 69; hpepratx@moog.com.

Paul Blunden, European Regional Manager, will be focusing on expanding future growth in the various European military markets. Paul joins Moog with years of experience in international production and sustainment services for OEMs. Paul can be reached at +44 1902 396492; pblunden@moog.com.

Moog Expands Spares Support for International F-16 Operators

Moog is the key OEM supplier of the Leading Edge Flap Drive Systems (LEFDS) for the F-16 and has been providing sustainment services to international operators for more than two decades. Moog has recently established an inventory supply center in Europe stocked with key F-16 spare LRUs and parts to support urgent demand for products by international operators. Direct all inquiries to Jennifer Morrison, 310 618 6433; email jmorrison@moog.com.

Moog Supports Ongoing Public-Private Partnerships

Moog is committed to supporting its customers through the use of public-private partnerships. Moog currently has several partnerships in place, covering multiple platforms and applications. These partnerships provide significant value by leveraging the specialized expertise, equipment and facilities of each organization.

Since March 2008, Moog has been under a public-private partnership with Ogden Air Logistics Center for the overhaul and upgrade of the F-15 pitch and roll channel assembly. Moog has also been under a public-private partnership since August 2007 with the Fleet Readiness Center Southeast for the F/A-18 leading edge flap system.

In November 2011, Moog also entered into a commercial service agreement with the Fleet Readiness Center East for the V-22 Osprey. Moog Military Product Support is actively engaged in discussion for future commercial service agreements with the Tinker Air Force Base for the B-2, and with the Fleet Readiness Center Southwest for the F/A-18 E/F and F-35.
Moog Offers Azimuth Damper Reliability Upgrade for TOW Missile Launcher

Moog has designed and qualified a new Azimuth Damper for the TOW Missile Launcher System. Over the last five years, Moog has made the reliability upgrade available to international operators through NAMSA as well as to the US Army Material Command. The improved damper design is constructed to handle the increased loads resulting from the addition of the ITAS system. These higher loads, combined with harsh operating environments, contribute to increased bearing wear and subsequent damper wear-out. To solve these issues, Moog’s improved Azimuth Damper design incorporates stronger housing elements and an additional support bearing for increased load carrying capacity. The three bearing design takes advantage of corrosion resistant materials and sealed bearings, which offer greater protection against sand, dust and moisture intrusion.

Moog Improves Product Support for Legacy Aircraft

Moog is the designer and OEM for the leading edge slat system on a legacy military cargo/transport aircraft. A ship set of slat system hardware includes 28 actuators plus a variety of torque tubes, angle gearboxes, etc. In recent years, the procurement of the ballscrews, a key subassembly of the actuator assembly, has become increasingly difficult as the sole-source supplier of these critical parts increased prices and stretched production lead times. In order to improve product support to the end customer, Moog developed and qualified a form, fit and functional replacement to the existing design. All engineering, CAD modeling, assembly and environmental testing were conducted at Moog’s facilities in East Aurora, New York and Torrance, California. The Moog ballscrew is now in production and is fully interchangeable with the previous supplier’s design.

Moog Expands Support for International C-130 Operators

In 2010, Moog Aircraft Group acquired the Milwaukee Operations of Triumph Accessory Services. With a long history of supporting international operators with turnkey logistics services, the Moog Milwaukee office enhances and expands Moog’s military aftermarket support program. This program includes comprehensive repair and overhaul support, spare parts support, performance upgrades, reliability enhancements and obsolescence management, and provides nose to tail solutions to C-130/L-100 operators and maintenance facilities around the world. For more information contact:

- Eric Filter +1 262 437 7500; efilter@moog.com
- Mike Krueger +1 262 437 7500; mkrueger@moog.com

Cold Spray Advanced Surface Repair Reduces Cost and Lead Time

Moog recently completed a helicopter tail rotor housing repair for a large defense prime contractor. Corrosion and manufacturing defects in the casting process created extensive pitting of the housing, which needed to be repaired using a cold sprayed aluminum alloy. Repairing this part with Cold Spray ensured the coating was more corrosion and wear resistant. The customer saved a substantial amount of lead time and the potential cost savings were significant. Moog also recently performed a successful Cold Spray repair for a major civil aircraft operator. The repair called for Moog to remove existing corrosion from a 737 nose wheel steering actuator and restore the part to its original specification by cold spraying a nickel metallic powder. Nose wheel steering actuators are typically exposed to harsh environments such as dirt, moisture and water, causing the gear to ultimately corrode. By repairing the parts with a cold sprayed nickel, Moog provided even greater corrosion protection, making the repaired part more dependable than the original.
Slip rings are used in systems that require unrestrained, continuous rotation while transmitting power and/or data from a stationary device to a rotating structure. Today’s sophisticated battlefield requirements depend on Moog’s slip rings for high bandwidth, high reliability and long life operation. With over 10,000 baseline designs, models are available in standard and custom configurations.

Fiber Optic Rotary Joints (FORJ) pass optical signals across rotating interfaces while maintaining the advantages of fiber such as high bandwidth capability and EMI immunity. These products are designed for high performance operation in extreme environments, including shock and vibration, temperature, humidity and dust. Configurations include: off-axis, singlemode and hybrid FORJ/slip ring assemblies. Electrical to optical media converters are available for end-to-end solutions.

Moog supplies a variety of resolvers and synchros for use in demanding military and aerospace environments. These rugged and reliable devices provide accurate position and velocity feedback as well as commutation, without the structural or temperature restrictions imposed by other electronic feedback devices. They are resistant to the shock and vibration levels often encountered in military and aerospace applications and exhibit high immunity to electrical noise. They are available in brush or brushless designs with a large selection of standard models. Our engineering department is also available to provide application consultation and to tailor custom solutions to meet challenging program needs.

Moog is a market leader in the design and production of housed and frameless servo and torque motors. We offer motors in brush-type, two-phase brushless and three-phase brushless configurations. All utilize high-energy permanent magnets and high-permeable armature lamination materials in producing fast servo response and high starting torque for demanding applications such as gimbaled positioning systems. Reliability and long life are hallmarks of our products. Available in frameless configurations for direct drive systems, or housed with optional gear heads, these motors are designed and proven in aircraft, missile, armored vehicle and naval systems.

Moog Air Moving Solutions designs and manufactures high performance efficient cooling products to solve difficult thermal, airflow and acoustic problems for use in rugged aerospace and military applications. These products are aerodynamically designed for optimized efficiency and acoustics and are combined with Moog’s high-efficiency motors for the lowest overall system power usage.

Moog provides integrated assemblies that combine DC torque motors, resolvers and slip rings into custom structures with bearings and seals. These assemblies are used in a two-axis gimbal that can be slewed and pointed at an incoming threat protecting commercial and military aircraft. The Moog assembly provides maximum performance at minimum space and weight.
For more information contact:

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