

Honeywell

ACTUATION SOLUTIONS

Delivering precision load management and motion control solutions.



Actuators are devices which impart motion onto another item for a specific function and duty cycle.

Actuators in the aerospace market are used widely throughout aircraft, both fixed- and rotary-wing, as well as in missiles, spacecraft, and other marine and surface vehicles. Functions range from moving flight control surfaces to extending the footrests in business-class seats.

Industry Challenges

Actuators are devices which impart motion onto another item for a specific function and duty cycle. Actuators in the aerospace market are used widely throughout aircraft, both fixed- and rotary-wing, as well as in missiles, spacecraft, and military surface vehicles. Functions range from moving primary flight control surfaces to extending the footrests in business-class seats.

Actuators may be operated by electric current, hydraulic fluid pressure or pneumatic pressure. Affordable actuation systems are needed for aircraft engine and thrust management control, noise and vibration control, flight surface control and aircraft utility functions such as fuel inerting and doors. In space, actuators are key to launch and satellite propulsion controls, solar array drives, antennae pointing and docking control. Reliable steering control actuators are critical for precision directional control in tactical missiles and guided munitions. The new generation of marine vessels relies on high-power electric actuation to critical shipboard functions such as ballast control, compartment isolation and vessel steering controls.

Honeywell's Response

Honeywell's Actuation Solutions use the latest electromechanical, hydraulic, fuelhydraulic, pneumatic technologies to deliver precision load management and motion control solutions for an array of the most challenging actuation applications.

Our weight-efficient, affordable solutions draw on several decades of fuelhydraulic, pneumatic and electromechanical applications on commercial, military and business jet platforms as well as space, missile and marine applications.



FIRST TO MARKET
WITH AN ELECTRO-
MECHANICAL THRUST
REVERSER ACTUATION
SYSTEM



COMMERCIAL,
MILITARY & BUSINESS
JET PLATFORMS
AS WELL AS SPACE,
MISSILE & MARINE
APPLICATIONS



ENGINE ACTUATORS
DECREASE SPECIFIC
FUEL CONSUMPTION
(SFC) FOR AIRCRAFT
ENGINES



LOWEST WEIGHT,
CAPABLE OF
WITHSTANDING
THE HIGHEST
TEMPERATURES IN
THE INDUSTRY



Honeywell's Actuation Solutions

AIRCRAFT ENGINE ACTUATORS are used for engine performance control and thrust management:

Engine Performance Control

- **Engine Control Variable Bleed Valve Actuator Systems.** The Variable Bleed Valve Actuator is a pneumatic, fuel-driven or electromechanical actuator which adjusts the position of engine bleed valves and provides feedback to the engine's controller. This increases engine efficiency, especially in higher pressure ratio engines and is available in fire-resistant and fire proof versions. Through robust design technology, Honeywell has a proven pedigree offering the lowest weight option, capable of persisting the highest temperatures in the industry. This includes the CFM56-5B and LeapX-1B turbofan engines.
- **Engine Control Variable Stator Vane Actuators** are highly optimized and technically differentiated engine actuators with a higher-temperature capability and lower-weight that decreases specific fuel consumption (SFC) for aircraft engines. It controls the position of the compressor stator vanes for several industry leading turbofan engines and commercial, business and military engines.

Engine Thrust Management: Thrust Reversers

- **Hydraulic Thrust Reverser Actuation System** is capable of executing mid-stroke commands, has redundant lines of defense and retention safety features and is the lightest-weight commercially available hydraulic solution. It is a high-performance actuation system that utilizes the existing aircraft hydraulic system supply to drive non-leaking, ball-screw actuators for transcowl deployment and re-stow. HTRAS is available for any commercial, military or business aircraft. These Hydraulic Thrust reverser systems are based on our legacy pneumatic thrust reverser systems deployed on CF6, JT9D, PW4000, TF39, TFE731, RB211, CF34 engines on Airbus, Boeing, Bombardier and Dassault aircraft.
- **Electro-mechanical Thrust Reverser Actuator Systems (ETRAS)** is a non-leaking, high-performance, digitally controlled actuation system that can translate the cowls from the stowed to the deployed position during reverser operation. It is capable of executing mid-stroke commands, has redundant safety features, and can provide prognostic and diagnostic information to the operator for enhanced fault isolation and maintenance capability. Honeywell was first to market with an electro-mechanical thrust reverser actuation system, and it is the most modern system in operation today. ETRAS is available for the Airbus A380 Trent-900 and GP7200 engines.

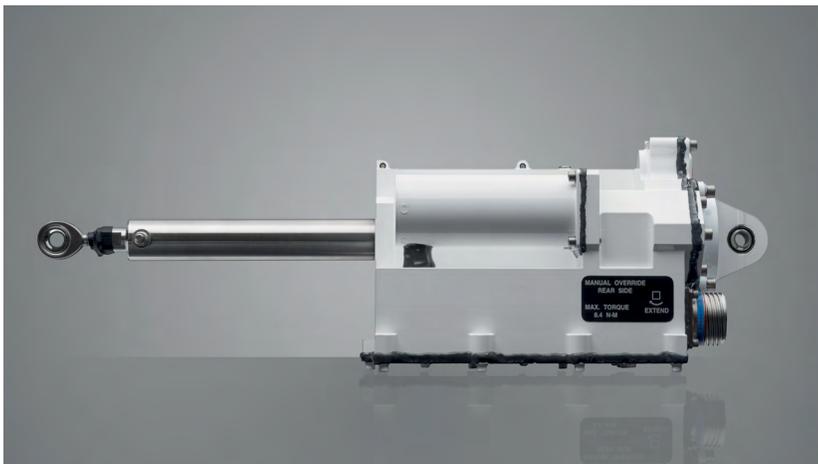


COMMERCIAL AND BUSINESS AIRCRAFT AND HELICOPTERS MOTION CONTROL SOLUTIONS

are used for noise and vibration control, Aircraft Utility Actuation and Flight Control Actuation.

- Engine to Aircraft Noise and Vibration Control.** We use the same mission-critical mount isolation technology employed in spacecraft to mount engines in commercial, military and business jet aircraft, thereby controlling engine noise and reducing vibrations in the cabin by between four and nine times compared to aircraft whose engines use traditional visco-elastic mount damping. This technology allows us to significantly reduce aircraft weight and reduce aircraft noise and vibration. It's available in passive and semi-active configurations for enhanced multi-mode vibration tuning, and has been carefully designed as the highest performing mount isolation system commercially available.

- Engine Aircraft Utility – Auxiliary Power Units (APU) Door Actuators.** APUs provide electrical power and compressed air to various aircraft systems and components. The APU door actuator controls the position of the inlet door to provide RAM air to the APU. These actuators are used on Gulfstream, Bombardier, COMAC and Dassault aircraft.
- Rotary Valve Actuators** are high performance, analog or digitally controlled actuators that integrate with aircraft controls to regulate various aircraft fluid flows based on system commands. These actuators are gear driven and are single or dual channel. The motors can be single phase AC, DC brush, or permanent magnet brushless DC type. The actuators all contain some form of end of stroke limit switches and in some cases, continuous stroke indication. Using highly reliable, flight-proven architectures, these actuators maintain cabin temperature with a manual mode in the event of power loss or failure. These actuators are available for Airbus A320 and A350 and Boeing 737, 747, 757 and 777 aircraft..
- Supplemental Cooling System Actuators** provide cooling for food and beverage refrigeration (galley cooling) and for avionics ground cooling. These actuators have built-in redundancy with self-limiting, limit switches for end-of-travel shutoff. They are available for Airbus A320 and A350 and Boeing 737, 747, 757 and 777 aircraft.



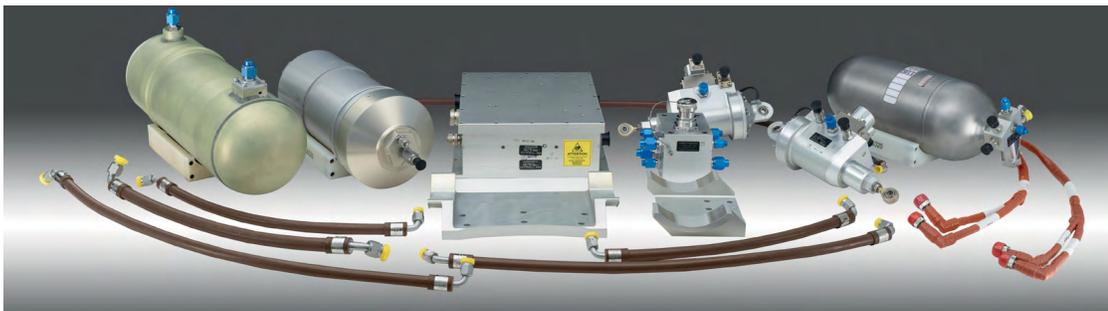


- **Fuel Tank Inerting (FTI) actuators** provide the FTI system with temperature and pressure controlled air, used to control the inert gas generation. An inerting system decreases the probability of combustion of flammable materials stored in a confined space, such as a fuel tank, by maintaining a chemically non-reactive or "inert" gas. Honeywell FTI actuators are available for Airbus A320 and Boeing 737, 747, 757 and 777 aircraft.
- **Flight Controls** The Pitch Trim Actuator is a high-performance, direct power application actuator that responds to vehicle power inputs to apply load and rate to the vehicle's pitch surface based on system commands. This actuator is deployed on the Boeing CH-47 Chinook heavy-lift helicopter.

SPACE APPLICATIONS

Honeywell actuators are used for launch vehicles and spacecraft for thrust vector control and engine valve control. Operating for the entire duration of flight, these actuation systems provide steering control to missiles and rockets. Satellite, cargo and crew vehicle utility motion controls include solar array drive mechanisms, antennae pointing and docking control.

- **Launch and Satellite Propulsion Controls – Thrust Vector Control and Engine Valve Actuation systems** provide steering control to rocket motors deployed on missiles, spacecraft and satellite launch vehicles. The Thrust Vector Control Actuation systems control the flight trajectory by moving the engine nozzle around a gimbal, or pivot point to change the thrust vector alignment. Honeywell systems have strong pedigree in multiple power sources including electromechanical, hydraulic blowdown, hydraulic and pneumatic. Includes deployment in platforms such as Standard Missile 3, RS-25 and AR1.





MISSILES

Honeywell actuators are used for steering controls including fast fin control and reaction jet control.

Steering Control

- **Fast Fin Control Actuation Systems** provide directional steering control to move tail fins and canard on tactical missiles and interceptors while operating inside the Earth's atmosphere (endo-atmospheric.) These actuation systems are used on Raytheon's Evolved Seasparrow Missile (ESSM®) – an international cooperative upgrade of the RIM-7 Seasparrow Missile.

- **Reaction Jet Control Systems** provide lateral thrust control to maintain precise attitude control or deliver high lateral force for divert maneuvering of missiles, spacecraft and ballistic missile interceptors. This new family of advanced high-temperature, fast-response actuators provides unmatched agility, maneuverability and end-game lethality to tactical missiles and precision guided munitions. These actuation systems are used on the ATK SM-3 (Standard Missile-3) for the U.S. Navy sea-based Aegis Ballistic Missile Defense System.



MARINE APPLICATIONS

Surface ships are moving toward more high-power electric actuation to reduce cost and maintenance. Our state-of-the-art marine electromechanical actuation solutions meet customers' needs in these harsh environments, providing marine vessels with a lower-cost alternative to leaky, expensive-to-maintain hydraulic actuation systems.



FAST-RESPONSE
ACTUATORS PROVIDE
UNMATCHED AGILITY,
MANEUVERABILITY
AND END-GAME
LETHALITY



FAST FIN
CONTROL ACTUATION
SYSTEMS PROVIDE
DIRECTIONAL
STEERING CONTROL



LOWER-COST
ALTERNATIVE TO
LEAKY, EXPENSIVE-
TO-MAINTAIN
HYDRAULIC
ACTUATION SYSTEMS

>60 YRS

OVER 60 YEARS OF
LEADERSHIP AND
EXPERIENCE IN
DEVELOPMENT OF
MOTION CONTROL
SOLUTIONS

Five standard actuator types are available, with power ranges from 0.6 to 7.0 Horsepower, using high-power 440V, three-phase DC motors. All are hand wheel-operable in cases where manual override is required. All of our marine actuation systems are designed for low power consumption, are protected against electro-magnetic interference, and produce minimal jitter and ripple motion thanks to their specialized motors, ensuring they give a superior long-life performance. They may be used for shipboard control of valves, utility functions such as bilge and ballast management, munitions or security handling and other utility functions. These actuators are used on the U.S. Navy Gerald R. Ford Class Aircraft Carrier.





Our History

Honeywell, with over 60 years of leadership and experience in development of motion control solutions for engines, aircraft, spacecraft and marine vessels. Has solved the many difficult challenges related to fast and reliable response to commanded surface control. Combining an extensively modernized electronic controls with sophisticated actuators provides our customers with safe, reliable and high performance vehicle control.

Why Honeywell?

Honeywell, a world leader in Actuation, continues to set the standard in Aerospace vehicle control. Our Actuation Solutions are based on proven technology, providing exceptionally high reliability and simplified maintenance. Honeywell continues to make significant investments in the research and development of Actuation technology to further increase the safety of air travel and improve vehicle dispatch reliability.

For more information

Visit us online at
[aerospace.honeywell.com/en/
product-listing/actuation](https://aerospace.honeywell.com/en/product-listing/actuation)

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Global Network of Support Services

Honeywell's comprehensive support network, spanning the Americas, Europe, Middle East, Africa, Asia and the South Pacific, delivers fully integrated service solutions and 24/7/365 support to meet the needs of the aerospace industry. As a world leader of aviation aftermarket services, Honeywell provides the knowledge and resources to take care of all your service needs—whenever and wherever you require maintenance and repair services.

Our comprehensive global services provide industry recognized service support including repair, overhaul, and asset logistics with unmatched turn-time and quality performance supported by the Honeywell Operating System (HOS).

Honeywell supports military customers internationally across Europe, the Middle East, Africa, India, Asia Pacific and the Americas, so wherever you are, we are.

Our international organization has its headquarters in Switzerland and we have facilities in countries including Afghanistan, Australia, Belgium, Brazil, Colombia, Czech Republic, France, Germany, India, Ireland, Italy, Japan, Kuwait, Mexico, Qatar, Saudi Arabia, Singapore, South Korea, Switzerland, United Kingdom, and the United Arab Emirates.

Honeywell offers local resources, domestic technology centers, manufacturing operations and local distributors and multi-lingual, 24/7 customer support centers to provide for all our customers.