

Micro motion, major impact: How precision motors are shaping the future of aerospace

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Electrification is drastically reshaping aerospace motion control. As commercial, defense, and emerging platforms shift away from hydraulic systems toward distributed electromechanical actuation, the demand for compact, high-performance motion solutions has never been greater. At the center of this shift is an often-overlooked component: the precision miniature motor.

When most people think about motion aboard an aircraft, the focus tends to fall on the obvious: engines, rudders, flaps. But the reality of modern aerospace is far more granular. In practice, modern aircraft rely on dozens of distributed motion systems managing everything from environmental control, cabin airflow management, cockpit inputs, and passenger seat actuation. While individually small, these systems are essential to overall aircraft performance and passenger experience—placing the same demands on reliability, compactness, and environmental resilience as more visible actuation functions.

These functions are flight critical, not ancillary—and their importance is only increasing as electrification accelerates across the industry.

A growing need for SWaP-optimized solutions

Across both commercial aviation and defense, engineers face a consistent set of challenges when specifying motion systems. Components must be optimized for size, weight, and power (SWaP) while maintaining reliable operation in extreme

environments, including temperatures from -55°C to +125°C, continuous vibration, shock, humidity, and corrosive conditions.

“In aerospace, every gram matters and every millimeter of space is contested,” explains Adrien Mettraux, Aerospace and Defense Industry Manager. “Engineers need motors that deliver exceptional power density without compromising environmental robustness. That’s what separates aerospace-grade precision motion from industrial applications.”

New aircraft architectures are multiplying demand further. Platforms such as eVTOL aircraft are fully electric, relying on a greater number of smaller actuators distributed throughout the airframe for redundancy. These newer platforms are expected to be manufactured at significantly higher volumes than traditional commercial aircraft, bringing a corresponding increase in motor demand.

The certification bottleneck

Performance and compactness, however, are only part of the equation. One of the most significant pain points for aerospace OEMs is environmental certification. Systems destined for flight must pass stringent validation, with commercial platforms required to meet DO-160G standards. Failure at this stage can lead to costly redesigns and extended timelines, making certification risk—rather than motor performance—the gating factor.

“Certification is where many programs stall,” says Adrien Mettraux. “If a motor fails during system-level environmental testing, the entire actuator must return to design and validation. Our approach is to address that potential risk at source, by engineering motion solutions that can independently withstand these standards at the component level.”

Introducing the commercial-off-the shelf platform

It is within this context that **Portescap™**, a **Regal Rexnord™** brand, is launching its Aero commercial-off-the-shelf (COTS) series: a dedicated range of aerospace precision motors purpose-built for mission-critical applications. The series is designed not only as a motor offering, but as a foundation for certified electromechanical systems.

The Aero portfolio, spanning diameters from 22 mm to 30 mm, has been engineered with a clear focus on SWaP optimization, environmental robustness, and certification readiness. Designed to meet DO-160G environmental standards, these motors are ruggedized to withstand harsh operating conditions, making a strong fit for both commercial and defense applications.

Rather than starting from a blank sheet, engineers can build on a pre-validated aerospace baseline—accelerating development while retaining flexibility for application-specific customization.

“COTS motors that already comply with aerospace environmental standards are something the market has been lacking,” explains Adrien Mettraux. “Typically, engineers either develop a fully custom solution or adapt an industrial product never designed for these conditions. This platform delivers a third option: a purpose-built aerospace motor, available off the shelf, with a proven supply chain and short lead times.”

For programs under schedule pressure, that can translate into earlier design freeze, fewer test iterations, and lower overall certification risk.

Designed for system-level confidence

A key feature of the Aero platform is its approach to qualification. Rather than relying solely on system-level testing, Portescap tests its motors at the component level against the relevant aerospace standards. By validating motors before they are integrated into actuators, the platform helps OEMs reduce redesign risk during formal qualification.

When an OEM integrates an Aero motor into an actuator assembly, it provides a solid basis for system certification. In practical terms, this can shorten qualification cycles, reduce the likelihood of late-stage failures, and help programs stay on schedule.

“That changes the development dynamic,” says Adrien Mettraux. “Our customers can accelerate their own qualification programs because they are starting with a motor that has already demonstrated compliance. It reduces risk, shortens timelines, and saves cost.”

Part of a broader motion ecosystem

As part of Regal Rexnord, this portfolio sits within a wider ecosystem of motion and control technologies. As aerospace systems grow in complexity, OEMs and tier-one suppliers are seeking to simplify their supply chains by working with fewer partners capable of delivering more integrated solutions.

“The trend is toward complete electromechanical actuation systems rather than standalone components,” notes Adrien Mettraux. “Regal Rexnord can combine precision motors with resolvers, brakes, ball screws, gears, and other components to deliver coordinated assemblies. That is a real advantage for customers looking to reduce supplier complexity.”

As electrification drives more distributed actuation across commercial, defense, and advanced air mobility platforms, the role of precision miniature motion will only expand. By combining certification-ready COTS motors with a broader electromechanical ecosystem, Portescap provides a faster, lower-risk path from concept to flight—without compromising the rigor aerospace programs demand.

Image captions:



Image 1: Across a typical commercial aircraft, dozens of motion systems handle everything from environmental control and cabin airflow management to cockpit inputs.

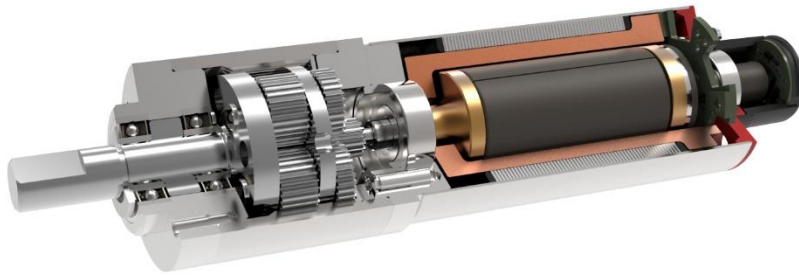


Image 2: Portescap's Aero platform delivers exceptional power density and reliability.



Image 3: Regal Rexnord's broad portfolio means it can combine precision motors with resolvers, ball screw, gears, and other components to deliver integrated motion subsystems.

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Regal Rexnord's 30,000 associates around the world help create a better tomorrow by providing sustainable solutions that power, transmit and control motion. The Company's electric motors and air moving subsystems provide the power to create motion. A portfolio of highly engineered power transmission components and subsystems efficiently transmits motion to power industrial applications. The Company's automation offering, comprised of controllers, drives, precision motors, and actuators, controls motion in applications ranging from factory automation to precision tools used in surgical applications.

The Company's end markets benefit from meaningful secular demand tailwinds, and include discrete automation, food & beverage, aerospace, medical, data center, energy, residential and commercial buildings, general industrial, and metals and mining.

Regal Rexnord is comprised of three operating segments: Industrial Powertrain Solutions, Power Efficiency Solutions, and Automation & Motion Control. Regal Rexnord is headquartered in Milwaukee, Wisconsin and has manufacturing, sales and service facilities worldwide. For more information, including a copy of our Sustainability Report, visit [RegalRexnord.com](https://www.RegalRexnord.com).

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