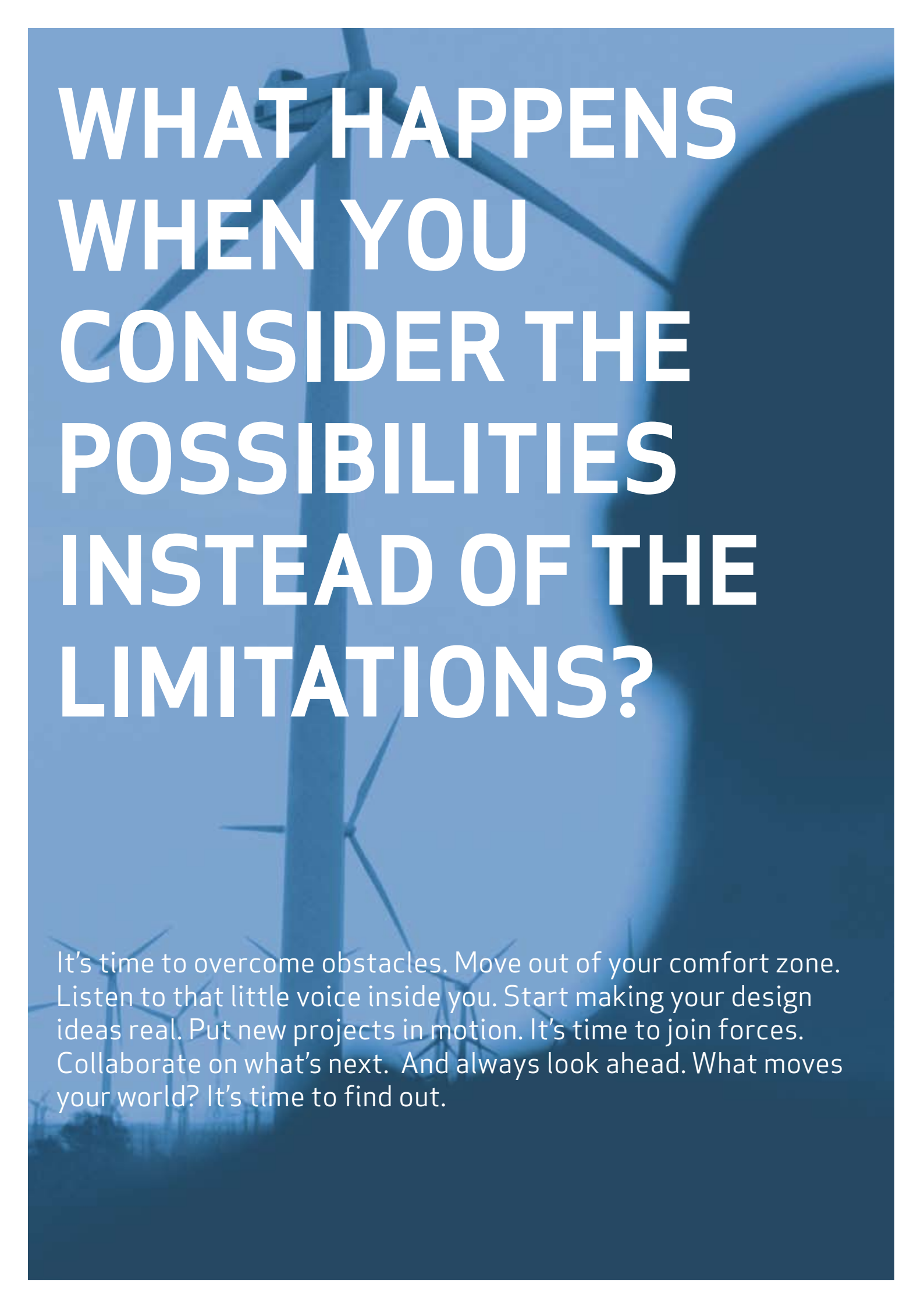


WHAT MOVES YOUR WORLD



MOOG



WHAT HAPPENS WHEN YOU CONSIDER THE POSSIBILITIES INSTEAD OF THE LIMITATIONS?

It's time to overcome obstacles. Move out of your comfort zone. Listen to that little voice inside you. Start making your design ideas real. Put new projects in motion. It's time to join forces. Collaborate on what's next. And always look ahead. What moves your world? It's time to find out.

A photograph of two men in a meeting. One man is pointing at a screen, and the other is looking at it. The image is overlaid with a warm orange glow.

6500+ EMPLOYEES. 24+ COUNTRIES. ONE MISSION.

Even if you don't know our name, you've still experienced what we can do. Moog motion control solutions are quietly at work in every corner of the globe, in a wide array of industrial applications where the highest level of performance is critical world-class productivity. Our forward-thinking approach to expanding the limits of hydraulic, electric and hybrid control technologies has helped us to earn the confidence of today's most respected design engineers, manufacturing experts and machine builders in markets like plastics, metal forming, textiles and beyond.

The power of collaboration

Despite the fact that Moog facilities operate in 24 countries around the world, our teams all speak a common language: helping our industrial customers take their ideas beyond what they thought possible. This mission extends throughout the larger Moog organization as well—a \$1 billion organization serving military and commercial aircraft, satellites, space and launch vehicles, missiles, industrial machinery, and medical applications.

By leveraging engineering breakthroughs from other areas and tapping into the key assets and expertise of the entire organization, our Industrial Group can offer a significant depth of intellectual capital and production capabilities.

50-plus years old and we're growing even stronger

Today, Moog is a respected product innovator and well-established organization with thousands of employees and a half-century of achievements and accolades. We're a public company listed on the New York Stock Exchange (NYSE Symbol: MOG.A and MOG.B). And we're setting new performance standards in world-class motion control solutions every day.

The true essence of our organization can be traced back to 1951 when founders Bill Moog, Art Moog, and Lou Geyer came together to form The Moog Valve Company around Bill's historic invention, the first practical servovalve—a high-performance control device that was more reliable and easier to build.

The collaborative spirit of these three ambitious pioneers lives today in our commitment to do whatever it takes to help customers address their unique challenges with expertise, advice and continually evolving product lines that help overcome their toughest obstacles.

TAKING YOUR VISION TO A HIGHER LEVEL



The pressure has never been greater on manufacturers to achieve greater efficiencies or higher productivity. To produce premium quality products right off the machine. Or to incorporate new raw materials or manufacturing processes.

Likewise, the demands continue to grow on industrial equipment to work harder, faster, longer and at less cost. Depending on the machine, the application, the region or the budget constraints, the right motion control solution may be hydraulic. It may be electric. Or it may require a combination of both.

No matter what the technology, Moog's control electronics and software provide the brains for high performance and control. Best of all, it all works together seamlessly.

That's why Moog application engineers always start with the challenge, rather than the product. We ask the tough questions. Dig deeper. Take the initiative. And think more about the end result than providing pre-packaged answers on how to get there. This technology-neutral approach gives you the benefit of our best thinking and the high performance of our world-class product lines.

Hydraulic solutions

Since inventing the first practical servovalve in 1950, our name has been synonymous with hydraulic motion control technologies. Today, Moog Servovalves, Servo-Proportional Valves, Servocartridges, Actuators, and Radial Piston Pumps can be found in a myriad of applications. These include plastic injection and blow molding machines; metal forming presses; gas and steam turbines for power generation; controls on paper

making machinery and steel mill equipment; control systems on Formula One race cars; actuators on fatigue testing systems; and control of flight simulators, among others.

Electric solutions

Clean operation, less noise and low energy consumption are just a few elements that make electromechanical motion controls the ideal solution in many applications around the world. Motion control with electric technology is a more and more viable option due to the development of powerful servomotors, servodrives, actuators and electronics. Applications as diverse as plastics machinery, carpet tufting machines, tube bending machines, gas turbines, downhole drilling and flight simulators all benefit from Moog expertise in this rapidly-emerging technology.

Hybrid solutions

What if you could harness the best of both hydraulic and electric technologies in a single unit closed-loop motion control solution for ultra high-end applications? Such hybrid solutions—including Moog's PowerShot™ Injection System used in the plastics industry—are the newest frontier. By incorporating the advantages of existing technologies—including modular flexibility and increased efficiency and cleanliness—into revolutionary solutions, we're working hard to move beyond industry conventions to create more robust systems for tomorrow's machines.



PUTTING COLLABORATION IN MOTION IN MARKETS WORLDWIDE

How can we help you operate more productively? More precisely? More economically?

By carefully analyzing your system requirements, your current technologies, your technical specifications and your overall performance objectives, and working together to help bring your ideas to life, we're making a real difference in today's most dynamic markets. Here are just a few:

Plastics

In the late 1970s, Moog revolutionized the plastics industry when we designed the world's first closed-loop injection motion control. Later, we helped OEMs design one of Europe's first all-electric injection molding machines—giving customers the clean, low noise, high productivity and energy-efficient benefits of electric motion control.

Today, Moog Servo-Proportional Valves, Radial Piston Pumps, Motion Controllers Servodrives, Servomotors and related software play a key role on virtually all high-performance injection molding machines as OEMs strive to deliver higher productivity and thinner, lower weight plastic parts using new materials and resins. Our high-performance systems provide precision control in injection and blow molding machines used in automotive, packaging, electronics and medical industries, to name a few. Likewise, our parison actuators provide the highest level of control in both hydraulic and electric systems.

We're also on the forefront of hybrid technologies used in high speed, high tonnage plastic machinery. Our hybrid PowerShot™ Injection System, for example, is a critical element in high-end plastics applications that require the high force and speed of hydraulics and the low noise and energy savings of electric. This revolutionary breakthrough came as the result of a working collaboration between Moog and one of Japan's leading large-scale plastics machinery manufacturers.

Metal forming

Leading machine builders understand that with the right motion control solutions, they can achieve higher productivity, better precision and greater part to part consistency. From closed-loop cushion control on vertical stamping presses to closed-loop, high-performance solutions for press brakes to electric motion control solutions on bending, powder and punch presses, Moog continues to set the pace in this dynamic industry. What's more, our experts are continually working to develop new hybrid solutions for greater efficiencies and productivity in metal forming.

Around the world, our products—including Servo-Proportional Valves, Radial Piston Pumps, intelligent Manifold Systems Servomotors and Servodrives, Actuators, Controllers and software packages—play a key role in automotive, appliance, and household consumer goods industries, among others.

Textiles

Textile OEMs are constantly seeking to improve mill productivity and the quality of fabrics to keep their competitive edge. These improvements depend on significant advances in electric motion control solutions. The advent of new yarns has resulted in the need to significantly modify the processes on the traditional weaving and spinning machines. These again have impacted the motion control algorithms used on these machines. Textile OEMs depend on motion control solutions carefully tailored for their machines. Moog supplies a variety of flexible solutions based on the electric servomotors, servodrives and motion controllers product lines.

CONTROL CHALLENGE #7

BEYOND THE FRINGE IN TEXTILES

WEAVING VERSATILITY AND HIGH PERFORMANCE INTO NEXT GENERATION CARPET TUFTING MACHINES

Modern carpet tufting machines must handle high-speed mass production operations involving complex colors, patterns and carpet pile height. For a world leader in tufting machinery, Moog worked closely with their machine designers to create new machines utilizing ten to 3,000 axes of motion control. We also helped develop complete systems to control the complicated synchronization of all these axes in many unique configurations. Handling this enormous quantity of axes required a customized approach involving highly integrated Servodrives, Actuators, small high torque Servomotors, and other custom electronics. Not to mention the expertise and design flexibility of Moog engineers in a technological realm where few precedents exist.

Flight simulation

Military and commercial aviators continually strive to improve their flying skills through flight simulation training. These cutting-edge simulators rely on Moog FCS motion control solutions for a variety of critical functions. In fact, we've been building components for simulators for more than three decades, starting with servovalves, moving to hydraulic actuators and finally to complete motion systems including large all-electric motion bases with a payload capacity of 12,000 kg (26,500 lbs.). Another Moog focus is designing the sophisticated control software that operates the bases and allows maintenance testing without additional test equipment. By meeting the ever-changing requirements of flight simulator performance, maintenance and safety, our design engineers have earned a reputation for innovative solutions that far outperform "off-the-shelf" technologies.

Motorsports

In Formula One motorsports, our high performance servovalves provide the speed and power density critical to the world's top teams. Specialized Moog Hydraulic Servovalves are used in Formula One clutches, differentials, throttles, gear shifts and engine intake valves. Designed specifically for motorsports, they're far lighter and fast acting than servovalves found in commercial applications. In fact, we're continually pushing the boundaries of what's possible—designing sophisticated sub-miniature valves with the same capabilities of much larger and heavier valves.

And many other areas, too

Where else are Moog motion control solutions helping OEMs overcome obstacles to productivity? In Power Generation, for example, Moog systems can be found in fuel metering valves for gas and steam turbines. Wind turbines also use our latest valve technology. Power generation plants around the world rely on Moog for rugged design and high dynamic response for improved position control.

Our solutions are also employed in steel and aluminum mills around the world. Paper making machines rely on Moog solutions for precision control in high-speed operations. You'll even find our expertise and systems at work in test equipment.

From our origins in closed-loop control to today's systems featuring software with embedded intelligence, Moog is poised to deliver motion control solutions for the next generation of high-performance machines. If you can imagine the possibilities, we'll help you achieve them.

CONTROL CHALLENGE #17

WINDS OF CHANGE

PRECISION CONTROL IN A HIGHLY DEMANDING ENVIRONMENT

The motion control requirements of energy-producing wind turbines are complex, entailing precise control of quickly moving blades while ensuring safe operation and minimal downtime. To provide optimal synchronization and position control—along with safe, reliable operation—Moog engineers went above and beyond to develop a unique product called the "pitch control valve." Based on our Digital Direct Drive Valve and enhanced with the intelligence to close the pitch position inside the valve, the innovative unit enables the customer to reduce the total system costs and add new, previously unachievable functionality. It also includes a fail-safe system for safer blade positioning, and remote diagnostics monitoring to reduce difficult climbs for maintenance.

BUILDING BETTER SOLUTIONS

For more than 50 years, Moog products have been specified for some of the world's most critical motion control applications. As new applications arise, our design teams work closely with customers to add new items to our extensive product rosters. Some are tailored for use in one-of-a-kind installations. Others become standard equipment on machines across many industries. These state-of-the-art products are continuously improved to take advantage of the latest technology breakthroughs and advancements. They are fundamental to the success of the high performance motion control solutions we develop in collaboration with our customers.

Servo Valves and Servo-Proportional Valves



When Bill Moog invented the first practical servovalve, his name became synonymous with high performance, reliability and versatility. Moog Servovalves today work in tandem with other motion control products and use the latest technologies including fieldbus communication, embedded motion control electronics, and configuration software that incorporates advanced motion control algorithms and interchangeability with open architecture systems. What's more, they can be found in a variety of specialized configurations including explosion-proof

models and fail-safe versions for unique machine needs. Yet they remain the heart of the motion control system, critical to machine function, quality and productivity.

Servomotors and Servodrives



For more than 20 years, our brushless servomotor products have earned a reputation for dynamic performance, power density and reliability in applications ranging from robotics, down-hole drilling, material handling, textiles, flight simulation, plastics and more. Through key acquisitions over the years, we've continually broadened our product range, always tailoring or modifying the specifications to fit our customers' needs. Actuators using our electric components provide high-performance, customized solutions for flight simulation, metal forming, blow molding and more.

Motion Controllers



Perfectly integrated with our Servovalves, Servomotors and Servodrives, as well as hydraulic products, Moog Motion Controllers help support an integrated system approach that provides benefits beyond what individual, off-the-shelf components can offer. Incorporating configuration software that meets IEC6-1131 standards, they can be designed to accommodate the requirements of so many unique applications, making these intelligent motion controllers the ideal choice of machine designers who want to take their equipment in new directions.

And much more

For example, Moog Radial Piston Pumps, Integrated Hydraulic Manifold Systems and Cartridge Valves uphold our reputation for performance and design modularity. And like our other product lines, these key components are always being redesigned and re-imagined for new and exciting applications.

CONTROL CHALLENGE #23

A NEW TWIST ON TUBES

POSITION CONTROL WITH LESS POWER CONSUMPTION THROUGH ELECTRIC TECHNOLOGY

Moog engineers collaborated with one customer to switch from hydraulic control of the forming axis to an electro-mechanical system capable of more efficient end tubing. Featuring an actuator capable of force amplification up to 100kN, real-time diagnostics, and a proprietary integrated toggle mechanism that reduces noise by 50% and power consumption by 75%, the system delivers machine cycles in 1.3 seconds and position accuracy of 0.01 mm (.000394 in) within a 100 mm (3.94 in) stroke.

CONTROL CHALLENGE #14

INJECTING PRODUCTIVITY

DELIVERING HIGH STABILITY AT HIGH SPEEDS IN ELECTRIC INJECTION MOLDING MACHINES

For one leading OEM of machines that provide high performance injection molding for the replication of optical disks, Moog helped to facilitate the move from hydraulic to electric controls. Working together, we created a complete motion control/process control solution that helped ensure 2.5-second production cycle time and less than one percent weight variation of the optical disk. Through our complete integrated solution—in which the servodrive included a controller for significantly increased bandwidth—we helped the OEM achieve higher productivity and stability, better accuracy, better energy efficiency, reduced cycle times and the flexibility to produce all optical disk formats and new ones in the future.

What's next?

Today, Moog continues to add to, enhance, reconfigure and redesign our product lines to ensure flexibility in cutting-edge applications. Current product and system initiatives include:

- Incorporating greater connectivity
- Adding embedded intelligence and software
- Enhancing total system integration
- Increasing product flexibility

Wherever industrial applications may evolve, we'll continue to design and build motion control solutions that not only keep pace with industry—but move it in bold new directions.

GOING WHEREVER YOUR IMAGINATION LEADS

A silhouette of a person's head and shoulders in profile, looking out a window. The background is a bright, slightly blurred view of a landscape or cityscape, suggesting a sense of looking forward or imagination.

From designing an electric actuator for flight simulators in the US to helping an Italian steel mill significantly improve its gauge control to working with a Japanese plastics machine manufacturer to develop the next generation of injection molding machinery, Moog motion control solutions impact companies in more than 150 countries in every corner of the world.

Worldwide

Our approach is simple and powerful. By having Moog teams living and working in so many different countries, we understand the global nuances of how and why our products are used. Which means we are well-versed at designing key solutions for specific markets. And always willing to modify or adapt products to fit your unique applications.

This unsurpassed level of local know-how, regional expertise and design flexibility ensures our motion control solutions are tailored to their environment. We know the machine regulations and performance standards. We understand the types of technical data our customers require. Our plants and facilities are right next door. In short, our entire team, from design engineering to customer service, is attuned to your business on a local level.

Aftersales support

Our commitment to customer collaboration never ends with the sale. In fact, Moog Authentic Repair® services are as reliable and flexible as our products. With trained and authorized service technicians on call around the world, you're assured of timely and precise repair of your Moog products should service be required.

In addition, we offer a variety of helpful, hands-on training sessions. Some are scheduled on a regular basis. Others are specifically designed to familiarize customers with new technologies.

Beyond these sessions, our expert part specialists can conduct frequent field service visits, and are always accessible via the telephone and email. In many regions, our specialists are available to assist in start-up/reinstallation, troubleshooting, on-site repairs or replacements, maintenance, and upgrades of our products. It all adds up to the assurance that no matter where you work, we're there for you to ensure your motion control applications are well managed and maintained. And we're always ready for what's next.

The background of the advertisement is a blurred, golden-yellow image showing the silhouettes of several people walking in a hallway. The motion blur gives a sense of forward movement and activity. The overall color palette is warm and monochromatic, dominated by shades of gold and brown.

IT'S TIME TO MOVE AHEAD

World-class solutions. Design flexibility. Global depth and support. All delivered by experts who understand your vision and are committed to helping you achieve it. It's what Moog is all about.

Whatever your next motion control challenge may be, we invite you to meet with us. Together, we can advance your ideas. Overcome your toughest obstacles. Create better ways of working. And move your world to new places.

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