

# WHAT MOVES YOUR WORLD

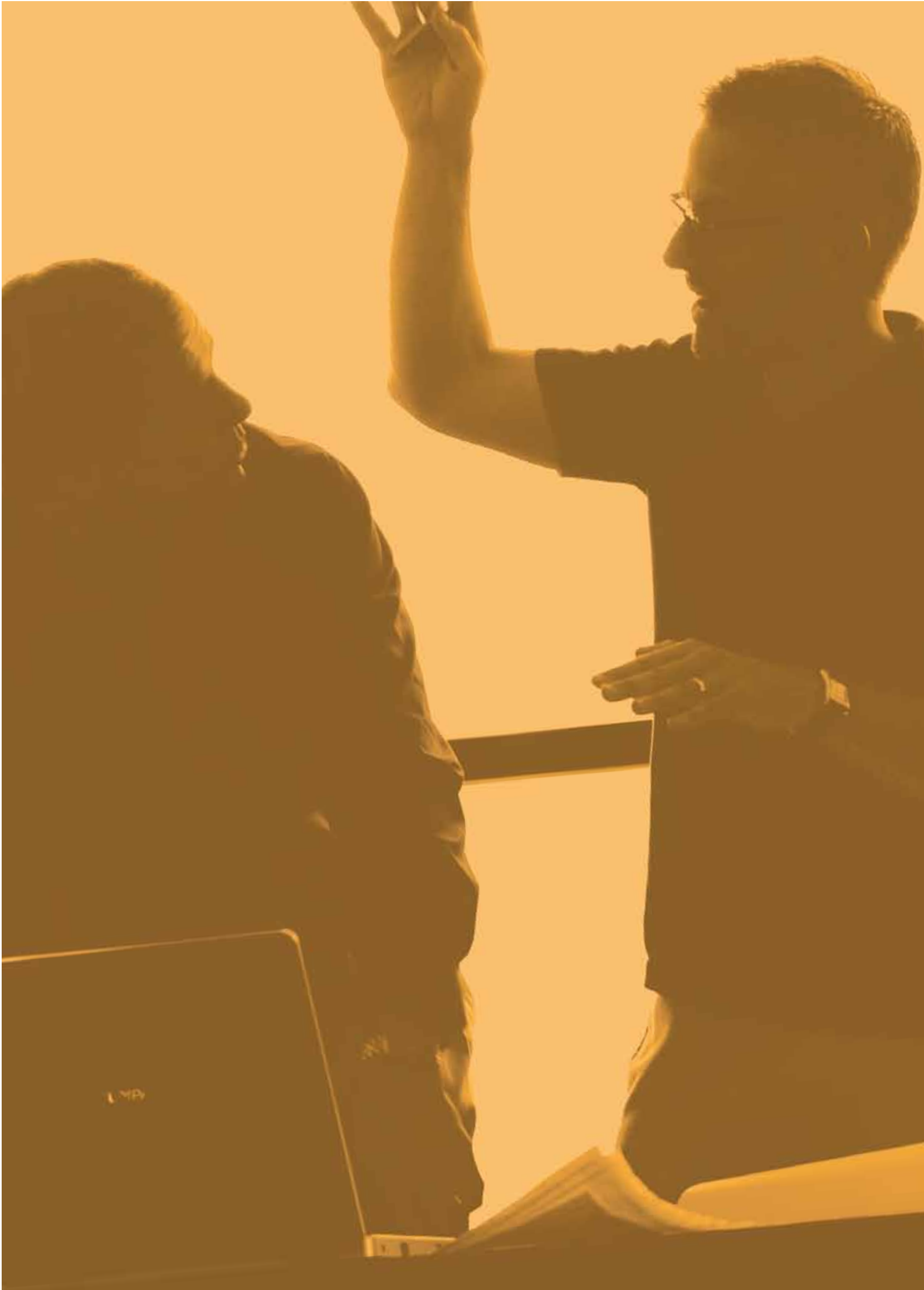


MOOG



# 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.



# 9800+ EMPLOYEES. 25+ 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 to 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, and beyond.

## **The power of collaboration**

Despite the fact that Moog facilities operate in 25 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 nearly \$2 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.

## **55-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, steam and wind 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, tube-bending machines, pitch control for wind turbines, gas turbines, down-hole 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? These hybrid solutions—used in the subsea industry, for instance—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:

## Wind energy

The motion control challenges for wind turbines are particularly complex, ranging from assuring efficiency to increasing reliability and safety. Moog offers high-performance electric and hydraulic solutions across four key application areas: blade pitch control, slip ring solutions, rotor monitoring and rotor blade testing. As a proven supplier to the world's leading wind turbine manufacturers, Moog solutions are in nearly 15,000 units in operation worldwide.

## Flight simulation

Military and commercial aviators continually strive to improve their flying skills through flight simulation training. These cutting-edge simulators rely on Moog 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 14,500 kg (32,000 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.

## Gas and steam turbines

Manufacturers of gas and steam turbines have relied on Moog motion control solutions for nearly two decades. While many customers still look at Moog for world-class hydraulic systems, increasingly engineers are turning to Moog for electric solutions including fail-safe actuators, controllers and explosion-proof motors.

## Plastics

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.



## Test

New designs, shorter time-to-market, more complex and costly test subjects, and the quest for greater cost efficiencies mean test engineers in the aerospace and automotive markets require a new breed of technology partner with the right mix of solutions and expertise. Moog combines electric and hydraulic components and systems with the flexibility and experience of test professionals uniquely suited to make today's automotive and aerospace tests more reliable and cost-effective. Through turnkey solutions, state-of-the-art software and controllers and unsurpassed expertise, we're helping customers shape the next generation of design with powerful test solutions that did not exist just a few years ago.

## 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.

## Motorsport

In Formula One motorsport, our high-performance servovalves provide the speed and power density critical to the world's top teams. In fact, we're continually pushing the boundaries of what's possible—designing sophisticated sub-miniature valves that are far lighter and fast acting 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?

Our solutions are employed in steel and aluminum mills around the world, providing position and gauge control that allow for higher productivity and superior quality of finished parts. Paper-making machines rely on Moog solutions for precision control in high-speed operations. In downhole drilling applications for oil and gas exploration, Moog has developed actuators, motors and electronics able to withstand extreme in temperature in harsh conditions.

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.

# BUILDING BETTER SOLUTIONS

For more than 55 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 Servodrive



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.

## Servoactuators

Moog has developed an extensive range of hydraulic and electric actuators that is ideal for high performance applications. Our offering includes world-class products as well as packages that combine electric linear servoactuators with servodrives and easy to use software. Known for long-lasting performance and reliability, Moog's actuators also offer easier installation and higher efficiency making them a cost-saving option for many new generation and retrofit machines.





## 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 IEC 61131 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.

## 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

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 presence

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.

## Expert services



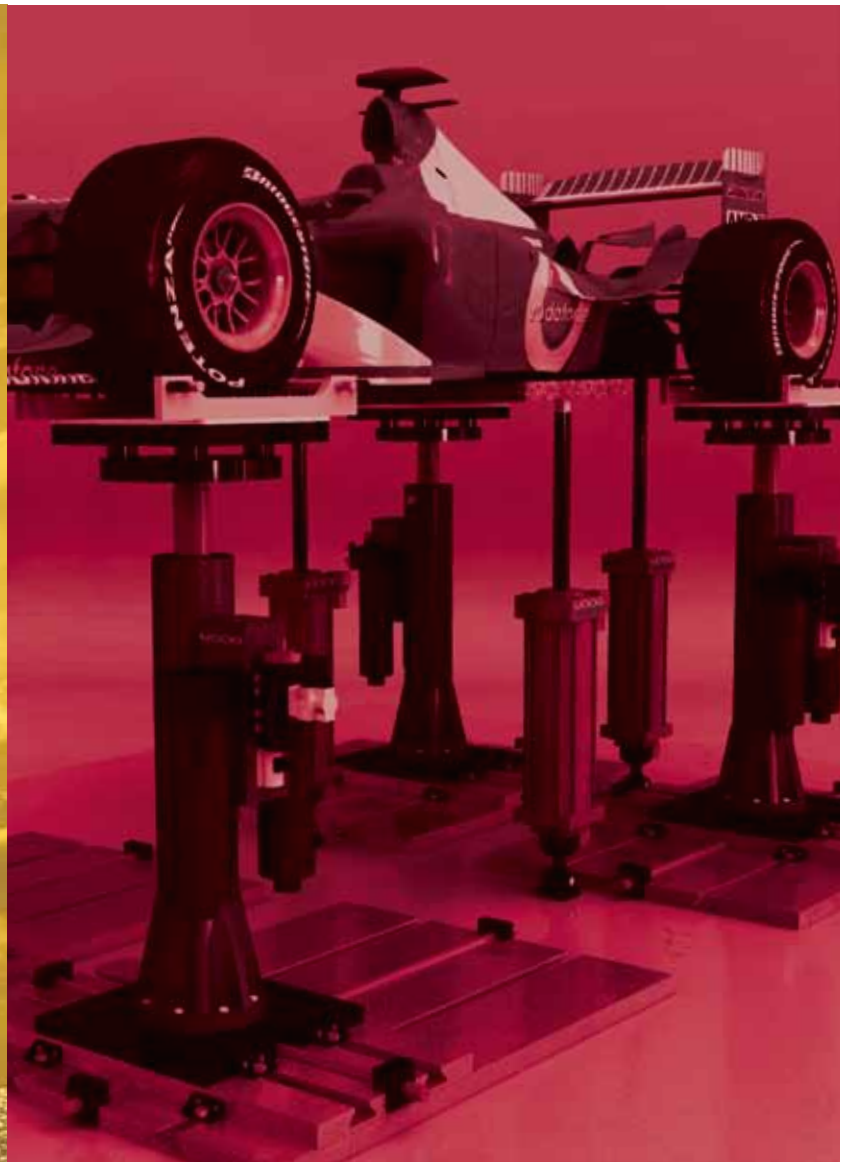
Our commitment to customer collaboration never ends with the sale. Moog Global Support™ is our promise to offer world-class Repair and Maintenance Services delivered expertly by our trained technicians. We help customers reduce their downtime by keeping critical machines running at peak performance.

In addition to repair services using OEM parts, Moog offers stock management of spare parts, onsite services for quicker commissioning, set-up and diagnostics and flexible programs for upgrades, preventative maintenance and multi-year contracts. 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.

# 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.



# TAKE A CLOSER LOOK.

Moog solutions are only a click away. Visit our worldwide Web site for more information and the Moog facility nearest you.

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