



Motion Solutions That Change the Game



How Motion Control Puts the Robo in Robotics

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Robotics, whether for mobile applications or not, depends greatly upon motion control technology

From the Roomba vacuum cleaner (a mobile application) to the DaVinci surgical robot system (a non-mobile application), motion control is required to move any robotic application.

The word robotics implies a fully functioning system – fully autonomous or at least automated in some fashion – that someone builds for intended purposes. An engineer programs a robot to perform a certain task or series of tasks and the user only needs to know how to operate it (i.e. understand how to power it, make the correct selections and push the start button).

Motion control, on the other hand, encompasses a range of components (such as electronic drives and controllers, motors and other mechanics) that work together to power a system. In order for those components to work together as needed, motion control technology and application engineering is required. One key part of motion technology is software. Without the various pieces of motion software integrated into the system, the components would be little more than a pile of electrical and mechanical parts.

While different in concept, robotics and motion control work hand in hand. In fact, motion control is a necessary subsystem of robotics. To help understand this, we've broken down in the following the key ways motion control puts the robo in robots.

Motion Control Ensures Precision

Every business strives for precision. But for some industries, precision is critical. In semiconductor manufacturing, for instance, Optical Critical Dimension spectroscopy is a key technology used for optical metrology (Figure 1).

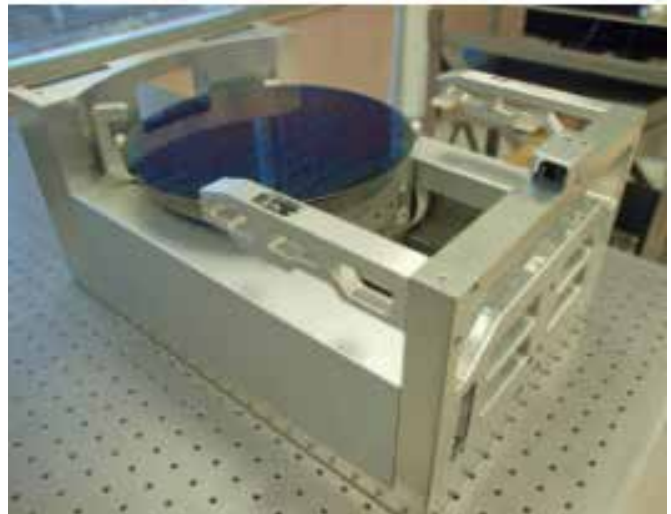


Figure 1. Optical Critical Dimension (OCD) spectroscopy is a key technology used for optical metrology and process control in semiconductor manufacturing. OCD enables measurements of the smallest semiconductor design features down to the nanometer level. At the heart of an OCD system is a high precision positioning system in the form of a highly integrated multi-axis stage system. The axes of the OCD's stages are controlled by a compact embedded motion controller. Working closely with the stage system designer, Allied Motion developed the advanced-performance custom motion controller module that powers the OCD system's stages.

OCD enables measurements of the smallest semiconductor design features down to the nanometer level. Movements in an OCD spectroscopy system clearly must be very precise. OCD systems are certainly automatic (in that they automate the OCD process), and for that reason, may be thought of as robotic.

At the heart of OCD systems is a highly integrated multi-axis positioning stage system that incorporates precise positioning mechanics. Servo motors power the system's individual axes, and in turn, are powered by servo motor controllers that together with the motors are capable of realizing highly dynamic, but precise, motions in the positioning system.

It Simplifies Robotic Control Systems

POW-R-STEER actuator for electric power-assisted steering

Bulky, inefficient controllers complicate how an application runs. In autonomous vehicles, and even in driven vehicles that use drive-by-wire technology, the vehicle's steering – and often its traction – are provided by electronic systems and components instead of classic mechanical systems to perform its main functions (Figure 2).



Allied Motion's **POW-R STEER** is an electronic power-assisted steering (EPAS) actuator complete with brushless motor, gearing, and programmable electronic motor controller.

POW-R STEER is applicable in ATVs, water-craft, material handling equipment, and various autonomous vehicles.

Efficient motion control technology replaces the heavy, power-hungry traditional mechanical and hydraulic components with accurate, efficient electro-mechanical control systems. Within the traction, steering and braking systems of these energy-efficient cars are brushless torque motors.

Motion Control is Essential for Modern Mobile Robotics

Custom torque motor actuator with integrated encoder and electronic controller for GPS-based steering system. The agricultural industry's modern farm is growing evermore dependent upon motion control technologies. One example is the GPS-based steering systems used for precision (or semi-robotic) farming (Figure 3).



Figure 3. One of the most successful tools available for modern precision farming is the GPS-based steering system. The

EZ-Pilot® system provides high-accuracy steering of agriculture equipment utilizing a compact electric motor actuator directly mounted to the vehicle steering wheel. The EZ-Pilot responds to commands from a GPS-based guidance system. The system is employed in both broadacre as well as high-accuracy row crop farming applications. An Allied Motion Megaflux brushless torque motor with integrated drive electronics is at the heart of the EZ-Pilot system.

Using a compact, direct-drive brushless torque motor actuator with an integrated servo motor controller mounted to the vehicle steering wheel, and connected to a GPS control unit, this system provides autonomous high-accuracy steering for agricultural field equipment.

Most people may not view this as a robotic system, but it is a form of robotic autonomous operation, and it's made possible in large part by modern motion control technology. Without the availability of modern, compact, efficient motion control components, precision farming would be much more difficult and expensive to accomplish.

Other mobile robot applications, such as IED disposal robots used by the military and service robots you find today in some hotels and larger retail outlets, are mobile because they are equipped with powered wheels and/or tracks. These robots extensively use motion control traction subsystems.

Let's discuss motion control solutions.

Do you have a robotic application in need of motion control, or do you just want to learn more about robotic motion control solutions? Then we invite you to contact Allied Motion. We speak robo! Contact us online, connect with us on Facebook or tweet us at [@AlliedMotion1](#).

To find out which motor is right for you, contact the Allied Motion application engineering team today

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About Allied Motion Technologies Inc.

Allied Motion (NASDAQ: AMOT) designs, manufactures and sells precision and specialty motion control components and systems used in a broad range of industries within our major served markets, which include Vehicle, Medical, Aerospace & Defense, and Industrial/Electronics. The Company is headquartered in Amherst, NY, has global operations and sells into markets across the United States, Canada, South America, Europe and Asia.

Allied Motion is focused on motion control applications and is known worldwide for its expertise in electro-magnetic, mechanical and electronic motion technology. Its products include brush and brushless DC motors, brushless servo and torque motors, coreless DC motors, integrated brushless motor-drives, gear motors, gearing, modular digital servo drives, motion controllers, incremental and absolute optical encoders, and other associated motion control-related products.

Allied Motion Solution Centers



Allied Motion maintains Solution Centers in three geographically strategic locations to assist our customers with all aspects of their product selection and buying decisions. These three facilities assure you of local support no matter your location around the globe.

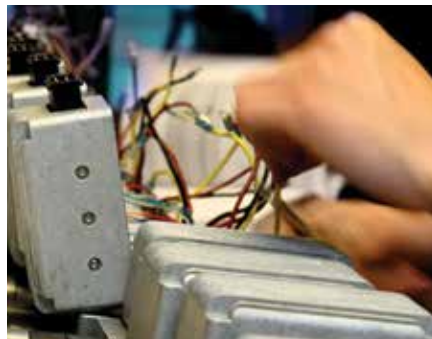
Each Solution Center is manned by experienced application engineering and customer service teams, which are available to provide:

- Application analysis assistance
- Detailed product information and documentation

- Standard product selection
- Product customization and options guidance
- Specification development assistance for custom-design products
- Price quotations
- Ordering, order status and shipment information
- Logistics assistance

For assistance with all of your motion applications, contact us at one of our continental Allied Motion Solution Centers.

Allied Motion also has a global network of factory trained selling partners to serve you. Call us; we'll put you in touch with an Allied Motion sales partner near you.



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