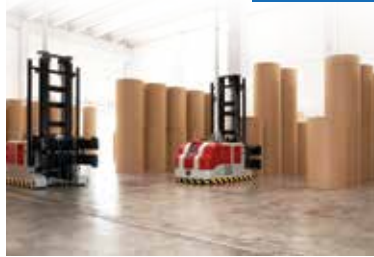




Motion Solutions That Change the Game



High-Performance Robot & Automation Motion Control Solutions

Advanced Solutions for Robotic/Automation Applications

Allied Motion products are in use around the world in a wide range of demanding applications. Our companies possess the expertise, products, and global presence to provide you with the motion solutions you need in today's highly competitive world.

Why Choose Allied Motion to be Your Motion Solution Provider?

Application Assistance

Allied's application engineers help you with product selection and integration.

Global Reach Solution Centers

Three strategically located Solution Centers – North America, Europe, Asia – offer local application engineering and sales support to make it easy to do business with us. "We speak your language."

Advanced Technology Products

Allied Motion develops advanced-technology products that enable our customers to "change the game." We strive to produce the most compact, innovative products with the highest performance at a competitive price.

Lean Enterprise: Allied Systematic Tools (AST)

Allied Systematic Tools (AST) is our set of lean enterprise business tools that drive continuous improvement. AST insures that our customers receive the highest quality products and service at the best possible price.

Quality

Our commitment to continuous quality improvement by applying Lean Six Sigma principles and by achieving ISO and AS certifications is a way of life at Allied Motion.

Automated Liquids Dosing

Precise, rapid dispensing of liquids like adhesives and resins requires a system capable of highly controlled microdosing. Shown here, an automated dosing system utilizes a servo powered progressive cavity pump (cutaway) that ensures accurate dispensing volume. The system maintains a linear match between dispenser speed and dosing volume, even with fluctuating viscosity and changes in system translational speed.

Allied Motion's HeiMotion brushless AC servo motors with integrated gearing and drive electronics are incorporated into this system and help ensure the flawless flow of liquids in precise, controlled volumes.



Allied Advantage

- Compact servomotor with integrated gearhead and power electronics provide high torque output to the pump
- A wide range of choices for motor size, rating and options makes it easy to select exactly the right drive

Other Applications

- Precision hydraulic pump systems
- Milking systems
- Tensioning systems



Industrial Automation

Pick and Place Robotics

Delta robots (and hexapods, too) are designed to be blazingly fast in pick and place applications, especially where objects to be picked may not always be in regular positions or oriented the same way. The general packaging as well as the medical and pharmaceutical industries rely on delta robots.

The dynamic performance demands placed on the motors for these robots are quite high. Allied Motion's HeiMotion Dynamic AC synchronous servomotors were designed to meet just such performance challenges of delta and hexapod pick and place robots. The result is maximum throughput in parts per unit time when Allied Motion is providing the driving force.



Allied Advantage

- Wide range of compact servomotors with torque, speed, rated voltage and feedback choices resulting in over 100 thousand possible models
- High performance capability enables precision picking and placing at high dynamic rates

Other Applications

- Gantry robots
- 3D printing systems

Industrial Automation

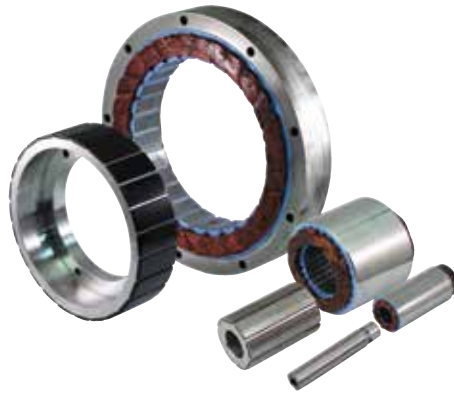


Allied Advantage

- Widest range in industry of joint motor types and models to choose from
- Motors and actuators available for payloads ranging from 0.5 up to 20+ kg
- Allied Motion offers other motion control products and solutions to add DoF axes, such as linear robot translations

Other Applications

- Exoskeletons: extend human worker ability; provide mobility for the disabled
- Biped robots to give them their mobility in addition to arm joint motions



COBOT Joint Motors & Actuators

COBOTs (COllaborative BOTs) are the most dynamic segment of the robot industry today. Designed specifically to work safely alongside humans, COBOTs bring the benefits of robotics to workspaces usually off limits to robots.

COBOTs are more capable than humans in terms of payload, reach and accuracy. Being highly configurable they can execute movements humans cannot (360-degree joint rotation, for example).

For years Allied Motion has designed and manufactured high torque density, direct-drive joint motors and actuators (integrated motor and gearing) for COBOTs. We know how to get the maximum from our motors and actuators to keep space claims and weight in COBOTs to the minimum. If our standard designs don't quite work, we customize them so they do.



Allied Advantage

- Fully-integrated traction drives for AGVs/AGCs and other warehouse vehicles
- Multiple standard WheelMax sizes and customs to suit any application
- Designed for 24/7-duty applications where high reliability and ruggedness are essential

Other Applications

- Medical patient transporter beds
- Service robots for commercial and retail settings
- Manually-guided pushers/pullers/tugs

AGV/AGC Traction Solutions

Material movement in factories and warehouses is becoming easier and safer with the advent of robotic material handling vehicles. Often referred to as AGVs (Automated Guided Vehicles) or AGCs (Automated Guided Carts), these semi-to-fully autonomous vehicles have seen explosive growth recently, especially in automated warehouses.

Allied Motion developed several traction wheel drive systems, including powered caster wheels and transaxles, specifically for autonomous vehicle traction use.

The fully-integrated WheelMax traction wheels combine everything — tire, gearing, brushless or PMDC motor, an integral electronic control, and even optional steering — for the most compact and advanced traction drives in the industry.

Automated Warehouse Robots

Factory and warehouse material stocking and retrieval tasks are now easier, more efficient and productive with the advent of autonomous material handling robots. These robots are often part of fully-automated intralogistics systems in modern manufacturing and warehouse settings.

Allied Motion's technology and expertise in fully-integrated powered traction wheels/casters, gear motor drives, and transaxles are providing innovative motion control solutions in modern automated material handling applications.



Allied Advantage

- Fully-integrated powered wheel drives with steering options
- Proven ruggedness and long life for 24/7 applications
- Easily accommodated custom requirements using our flexible product platforms

Other Applications

- Manually-guided pushers/pullers/carts
- Light electric lift trucks
- AGVs and AGCs

Warehouse Truck Electric Steering

Allied Motion's EPS series of servo steering actuators are the ultimate in battery-powered electric steering for warehouse trucks from the smallest pallet lifter to large reach trucks. The EPS is a cost-effective integration of brushless motor, gearbox and controller in a compact, versatile, long-life, trouble-free electric steering solution.

Combine the EPS with the innovative SWS sensor for a complete steer-by-wire system. The SWS is specifically designed for reach trucks and gives a superior steering feel due to its comfortable stick-slip-free magnetic friction and high resolution sensing. The unit is designed to be easily integrated directly into the vehicle's CAN network.



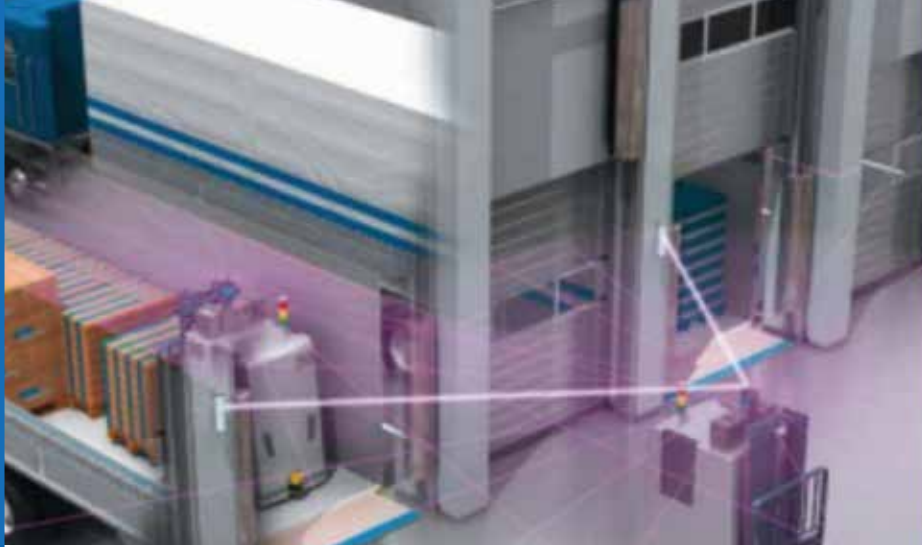
Allied Advantage

- Fully integrated brushless steer-by-wire system for warehouse trucks
- Multiple EPS models cover virtually all vehicle sizes
- High resolution wheel position sensor with magnetic friction for a natural steering feel
- Allied's application engineers will help you with selection and integration

Other Applications

- AGV/AGC electric steering control
- Guided and autonomous factory material handling vehicles





LiDAR Sensing for Autonomous Vehicles

Key to the operation of many autonomous vehicles is the LiDAR (Light Detection And Ranging) sensing system. Using a pulsed laser combined with a scanning and detection system, LiDAR systems enable autonomous vehicles to “see” their environment. These sensors are used extensively on automated warehouse and factory vehicles like AGVs/AGCs.

Allied Advantage

- Lightweight yet robust brushless motors designed specifically for LiDAR applications
- Willingness to modify or custom-design sensor motors to meet highly specific requirements
- Wide range of existing designs to choose from

Other Applications

- Autonomous towing and cleaning robot navigation
- Driverless automobile and truck navigation



Allied Motion has provided compact, inner- and outer-rotor brushless motors to the LiDAR industry for use in their precision laser navigation systems. Important characteristics for LiDAR sensors met by Allied's motors are high shock resistance, long life, wide temperature range, excellent angular resolution and accuracy, and high reliability.



Automated Highway Marking

Allied Motion is helping to make highway marking/painting faster, safer and highly automated. GPS-based marking system vehicles are now able to accurately locate and record roadway markings prior to repaving, and then precisely repaint the markings after paving, thanks in part to Allied Motion technology.

Our Megaflux brushless torque motors with integrated drive electronics power supplementary steering systems on these vehicles. The result is accurate positioning of the paint carriages and nozzle arrays to within fractions of an inch even at highway speeds.

Allied Advantage

- Housed direct-drive brushless torque motor—no gearing necessary
- Advanced integrated motor drive electronics connect to vehicle network
- Allied engineers work with you to customize our technology to fit your exact needs

Other Applications

- Highway construction heavy equipment
- Farming equipment
- Automated floor cleaning equipment

GPS-based Agricultural Vehicle Steering

One of the most successful tools for modern precision farming is the GPS hands-free guidance system. Allied Motion's engineers develop steering actuator systems with integrated controller electronics for tractor and other farm vehicle OEMs and after-market automation system suppliers. Our brushless actuators are employed in both broad-acre and high-accuracy row crop farming applications.

Allied's Megaflux torque motors with integrated control electronics are in daily use on farms globally. Here's an example of a compact plug-and-play motor actuator that fastens directly to the steering column.



Allied Advantage

- Compact steering actuator with integrated motor and control electronics
- High-performance brushless torque motor for gearless, direct-drive control
- High dynamic motor-controller performance enables consistent, accurate tracking

Other Applications

- Spreaders, combines, floaters, articulated tractors
- Self-propelled sprayers
- Tracked vehicles



Patient Transport Gurney

Pictured here is a special motorized gurney with a built-in transfer belt system that enables a single caregiver to safely transfer a patient within a medical facility without having to physically lift the patient.

The 1400-lb. gurney has two powered traction wheels, connected by an articulated steering mechanism. Allied Motion supplied the custom brushless motor shown, based on our EnduraMax 75i series, to power the traction wheels and steering mechanism.

The traction motors were custom-designed with integrated power electronics, application-specific software, high power capacity, and an integral holding brake, all in a compact, cost-effective traction solution.



Allied Advantage

- Custom brushless motors specifically tailored and optimized for the application
- Integrated power and control electronics reduce wiring
- Allied's product platforms and technologies provide an advanced starting point for custom projects like these

Other Applications

- Hospital autonomous mobile robots for telepresence and delivery of food, linens, medications and more
- Warehouse AGV/AGC material transport platforms
- Other autonomous and human-guided utility carts, tugs and pushers

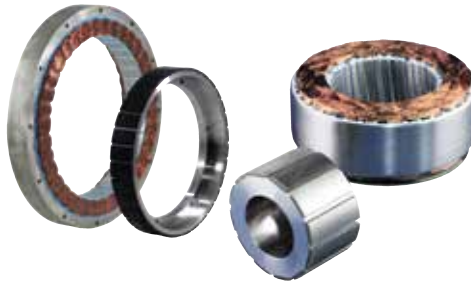


Allied Advantage

- Proven track record of successful use in multiple surgical robots
- Full customization and co-development when needed to meet requirements

Other Applications

- COBOTs for medical, industrial and commercial applications
- Clean-room robotics for the semiconductor industry



Surgical Robotics

Robot surgery, computer-assisted surgery, and robotically-assisted surgery are some of the terms used to refer to today's advanced robotic surgical tools that allow surgeons to perform many types of complex procedures with higher precision, flexibility, control and less invasively than is possible with conventional surgical techniques. Robotic surgery is usually considered to be minimally invasive surgery where procedures are performed through tiny incisions in the body.

Allied Motion is a leading supplier of motion control products employed in surgical robot systems. Our HT and Megaflux direct drive torque motors, in particular, are a preferred choice by surgical robot manufacturers for use in their robots. More than a dozen of these high performance brushless torque motors may be used in a single robot.



Allied Advantage

- Widest selection of frameless brushless torque motors available
- Allied Motion's willingness to customize our motors as needed, or create a design from scratch

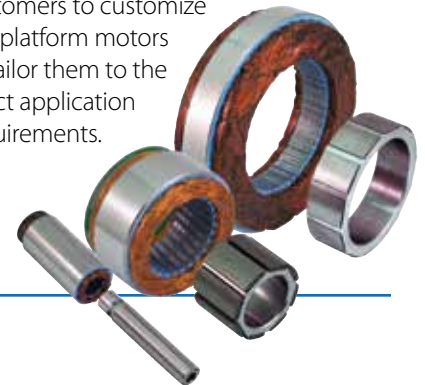
Other Applications

- Exoskeleton suits that amplify a worker's strength, while reducing injury and fatigue
- COBOTs used in industrial and commercial applications

Medical Rehabilitation Robotics

Robots are increasingly used in medical rehabilitation settings to assist patients as they regain strength and mobility after trauma. The robotic gait and balance trainer shown here is one example. Robotics is also successfully being applied to exoskeletons that patients wear to enable their mobility.

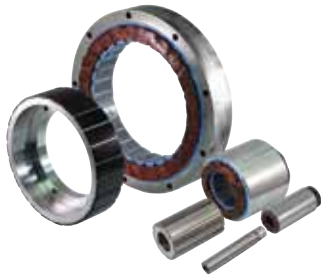
Allied Motion's high torque density motor kits (stator + rotor) are ideal choices for the joints of such trainers and exoskeletons owing to their compact size and high efficiency. In addition, Allied Motion engineers work closely with our customers to customize our platform motors to tailor them to the exact application requirements.



Rough Terrain Robots

Allied Motion's brushless torque motors and servo motors find their way onto several defense robotic applications. From a dual-arm robotic manipulator system that is capable of lifting heavy payloads and handling a myriad of field missions with human-like handling abilities, to the propulsion and arm axes of an IED search and disposal robot enabling it to climb uneven terrains and rock strewn slopes, Allied Motion's custom solutions are changing the game in defense-based robotics.

- Humanoid exoskeletons
- Bomb & explosive ordinance disposal robots
- Security / patrol robots



Allied Advantage

- Frameless torque motors are designed for direct-drive in traction drives and arm joints
- Wide range of frame sizes (20 mm – 792 mm O.D.) and torque rating (0.008 Nm – 1875 Nm continuous)
- Allied's application team works with you all the way to insure project success

Other Applications

- Biped & quadruped robots
- Collaborative robots: robotic grippers for collaborative robots
- Submersible ROV's & unmanned surface vehicles



Guided Multiple Launch Rocket System (GMLRS)

The innovation of adding guidance to free-flight surface-to-surface artillery rockets added unprecedented accuracy to the MLRS system. When Global Positioning System (GPS) capability was added to the GMLRS, near precision delivery (5 meters CEP) was achieved, and that is at a delivery distance of more than 70 km.

Allied Motion's electro-magnetic actuators are used in the GMLRS to actuate small nose canards as part of the guidance and control package housed in the nose of the rocket.



Allied Advantage

- Fully custom, mil-spec and test electro-magnetic actuators
- Long-term commitment to delivery from a long-standing U.S. supplier of mil-aero motion products

Other Applications

- Underwater UVs
- Aerial UAVs and drones
- Field-deployed guided and autonomous robots

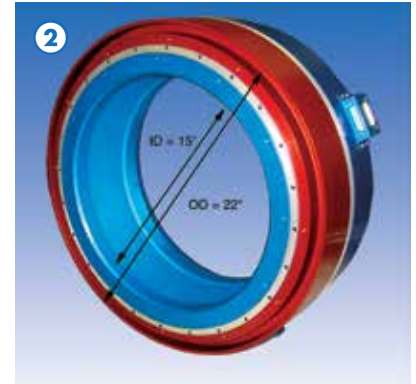
Custom Products

Custom & Specific Purpose Products

As the previous pages show, Allied Motion offers a very wide selection of standard motion control solutions to satisfy the requirements found in the commercial, industrial and aerospace and defense markets. And, we are adding new products every year to meet new demands we find in those markets.

However, a recognized strength of Allied Motion is our willingness and ability to develop custom motion control products and systems to meet the specific needs of customers. We may start with one of our standard products and modify it as needed, or as often is the case we start with a “clean sheet” and develop exactly what is needed when a modified standard will not suffice.

Shown here is just a sampling of some of the custom and specific purpose products we’ve developed for our customers.



- ① *Brushless Torque Motor with Integrated Controller for GPS-guided Steering on Agricultural Field Machinery*
- ② *Large Brushless Torque Motor for Space Station*
- ③ *Brushless Motor with Pump for Fuel-Cell Cooling System*
- ④ *Brushless Motors with Mirrors for Laser Scanner Systems*
- ⑤ *Brushless Gear Motor for Kidney Dialysis Machine*
- ⑥ *Brush DC Gear Motor with Integrated Controller for Agricultural Air Seeder System*
- ⑦ *Agricultural Seeder Actuator with Integrated Drive and Wireless Connectivity*
- ⑧ *Latch Pin Actuator with Integrated Drive for Military Vehicle Door*

Allied Motion Solution Centers

Allied Motion Solution Centers provide support to customers around the world from five geographically-strategic locations. Each facility is staffed by experienced application engineers and customer service teams to assist you with all aspects of your motion control needs. We also have a global network of factory-trained Allied Motion Sales Partners to serve you. For contact information on the location nearest you, please see below or visit our website.

Global Presence and International Support



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