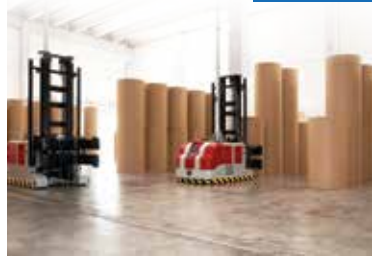




*Motion Solutions That Change the Game*



**Advanced Electric  
Traction & Steering  
Solutions**

# Advanced Solutions for Electric Traction & Steering 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.

### Example Traction & Steering Solutions

Automotive	4
Commercial Transportation	
Material Handling – Manned	5
Material Handling – Automated	
On-Road Vehicles	6
Off-Road Vehicles	
Utility Vehicles	7
Recreational Vehicles	
Material Handling – Autonomous	8
Mobility for People with Disabilities	
Patient Handling	9
Hospital Robotics	
Marine	10
Defense Robotics	





### Allied Advantage

- Models for paraxial-mount belt-driven rack and steering column-mount configurations
- Various mechanical and electrical interfaces available to simplify system integration
- Allied's application engineers will help you with customizations and integration

### Other Applications

- Commercial vehicles
- Luxury motor homes
- On-road utility and service vehicles

## Electric Power Steering

Allied supplies electric brushless motors for power steering to several well-known automotive brands. Two examples are shown here: a paraxial belt-drive type that mounts beside the rack and a patented column-mount type for either single or double pinion rack systems.

Allied Motion's Electric Power-Assist Steering (EPAS) motors have been proven to have high power density, high torque, low cogging, and excellent noise, vibration, harshness (NVH) performance, considered a must for luxury vehicles.

Critical to automotive OEMs and suppliers is unquestionable quality and on-time delivery, two measures that Allied Motion has maintained at virtually 100% for years.



### Allied Advantage

- Brushless hydraulic pump motor with integrated drive electronics and models to cover virtually all vehicle sizes
- Serves as an intelligent node in modern vehicle networks
- Optional integrated hydraulic pump

### Other Applications

- Lift trucks with hydraulic steering
- Construction vehicles
- Agricultural equipment

## Truck & Bus Electro-Hydraulic Steering

Allied Motion offers the EHS series, specifically designed as electric hydraulic pump drive motors for power steering systems in buses and trucks.

Manufacturers and their customers looking for improved fuel efficiency, cost savings and design flexibility will appreciate the performance offered by the EHS series. EHS durability and long life have been proven in the toughest environmental conditions.

The EHS series represents the ultimate intelligent motion solution for electro-hydraulic power steering and auxiliary power systems for over-the-road trucks and buses.

## 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

## 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.



### 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





### 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

## 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

- 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

## 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.





## Pushers, Pullers, Tugs

Powered movers (pushers, pullers, tugs) are increasingly popular in commercial and industrial applications for the productivity gains, worker safety and injury reduction they afford.

Allied Motion's family of transaxles provides a cost-effective, reliable traction solution for manufacturers of these movers.

### Allied Advantage

- Models with zero-turn radius capability
- Models to move unit loads up to 2000 lb (907 kg)
- Integral parking brake is standard
- Available with PMDC or brushless DC motor
- Hardened steel gearing and die-cast housings for ruggedness and reliability in daily rough use

### Other Applications

- Custom high-load solutions for aircraft movers
- Autonomous material handling AGVs/AGCs
- Medical mobility scooters, wheelchairs and patient transporters

## Recreational All-Terrain Vehicle Steering

Allied Motion's POW-R STEER (PRS) is an advanced Electric Power-Assist Steering system that offers unparalleled design flexibility to the recreational sport vehicle OEM. The compact, fully integrated POW-R STEER includes a low-cog brushless motor, a non-contact torque sensor, and a built-in intelligent motor controller.

The PRS gives the OEM easy feature and function programming during the development process, including tailoring of torque parameters to respond to vehicle speed or steering speed, and to provide kickback damping.



### Allied Advantage

- Long-life brushless motor and integrated SVPWM controller
- CAN programming and diagnostics for easy set-up and monitoring
- Rugged die-cast housings and splined shafts for uniform torque transfer

### Other Applications

- Autonomous transporter vehicles
- AGV/AGC material handling vehicles
- Golf carts and off-road utility/service vehicles





### 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

## 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

- Brush DC or brushless gear motors with optimized gearing for quiet operation & long service life
- Standard integral, manually-releasable parking brake
- Available in sealed (IP65) versions

### Other Applications

The RAD series is also ideal for:

- Personal mobility scooters
- AGV/AGC material transport platforms
- Hospital patient & linen/food service transporters
- Other recreational and utility vehicles

## Power Wheelchairs

Allied Motion's rugged gear motors, especially the RAD series, are in use today in many power wheelchairs. One example is the Trackchair™, a unique zero-turn-radius, all-terrain wheelchair developed to enable wheelchair-bound people to enjoy the freedom of getting off-road. Another is the bariatric wheelchair that is rated to carry up to a 600-lb. person.

Medical mobility equipment like these require dependable, quiet DC or brushless DC motors and gearmotors for reliable, long-life operation. That's why manufacturers in the medical mobility industry use Allied Motion's proven gear motors (and transaxles) in their products.



## 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

## Autonomous Hospital Robots

The day is fast approaching when physicians will make most rounds using remote presence robots (aka telepresence systems), and surgeons will assist peers from remote, even distant locations.

Meanwhile, autonomous robots are seen increasingly in hospitals delivering meals, linens and medications. These types of service robots promise enormous savings in time and cost for hospitals and other medical institutions.

Allied Motion's gear motors, powered traction wheels, and torque motors are making this new wave of "helper" robots a reality.



### Allied Advantage

- A variety of standard motion products for traction, steering, and lifting applications
- Direct-drive motors minimize drive system space-claim in robot platforms
- Customized drive system solutions—no need to accept less than ideal products for your application

### Other Applications

- Retail shopper consultant robots
- Hospitality service robots
- Monitored and autonomous security robots



### Allied Advantage

- Custom brush DC motors specifically tailored and optimized for marine environments
- Custom shaft, mounting, and leads or connector arrangements
- Corrosion protection coatings and stainless steel shaft
- Substitute brushless DC motors with integral power control electronics

### Other Applications

- Motors for vessel oil change pump systems
- Motors for rapid boat fueling and defueling pumps
- Motors to power vessel accessory systems (HVAC air moving, anchor winch, etc.)

## Watercraft Hydraulic Power Steering

Manual steering of larger power boats is difficult, especially those fitted with multiple engines. That's when helm hydraulic assist steering systems become a necessity for good control and safe, pleasurable boating.

Allied Motion supplies reliable, sealed hydraulic steering pump motors such as our Endurance line of PMDC motors in various sizes and power ratings for use in watercraft power steering systems.

Our rugged Endurance brush DC motors are custom-engineered to meet the power and environmental demands of steering assist applications in the marine recreational watercraft industry.



### 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

- Autonomous security/patrol robots
- Military field materiel and injured war-fighter retrieval robots
- Commercial telepresence and retail service robots

## Explosive Ordnance Disposal Robots

Allied Motion developed special versions of our brushless torque motors and gear motors for military/police explosive device disarm/disposal robots.

The multi-mission robot shown left negotiates rough terrain and even climbs stairs while handling payloads up to 68 kg, thanks to Allied's torque motor power reserve capability.

The dual-arm robot below lifts 50 kg and handles myriad field missions with human-like abilities.



# 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.

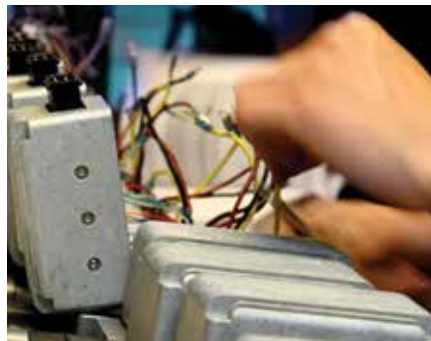
Each Solution Center is manned by experienced application engineering and customer service teams, which are available to provide:

- 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.



*Allied Motion Solution Center NA*





*Motion Solutions That Change the Game*

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