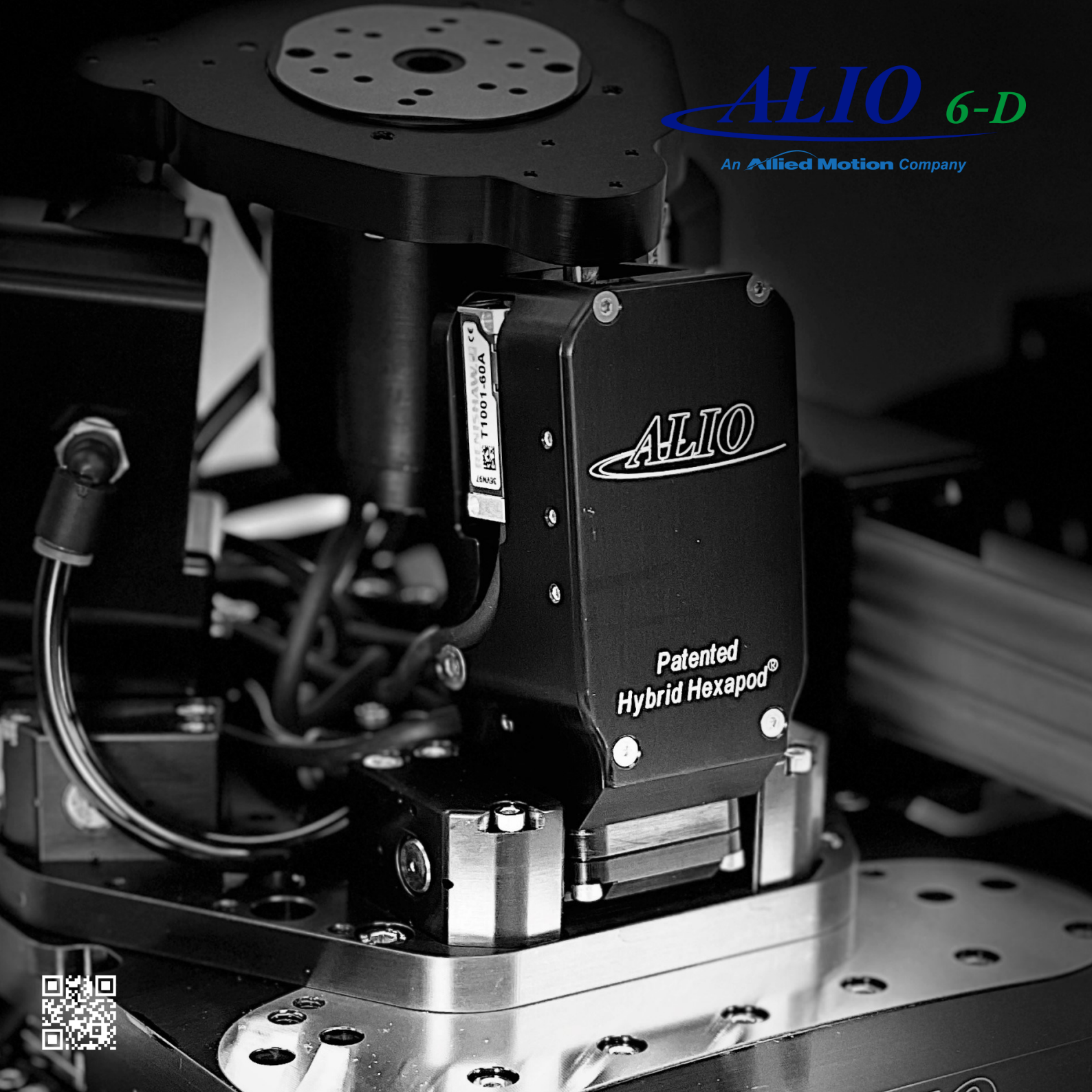

ALIO
6-D
An Allied Motion Company
ALIO
Patented
Hybrid Hexapod®

ALIO 6-D

An Allied Motion Company

About ALIO

In Latin, ALIO means “A Better Way”, and since 2001, ALIO Industries has been creating a better way to meet industry demand for nanometer-level motion control.

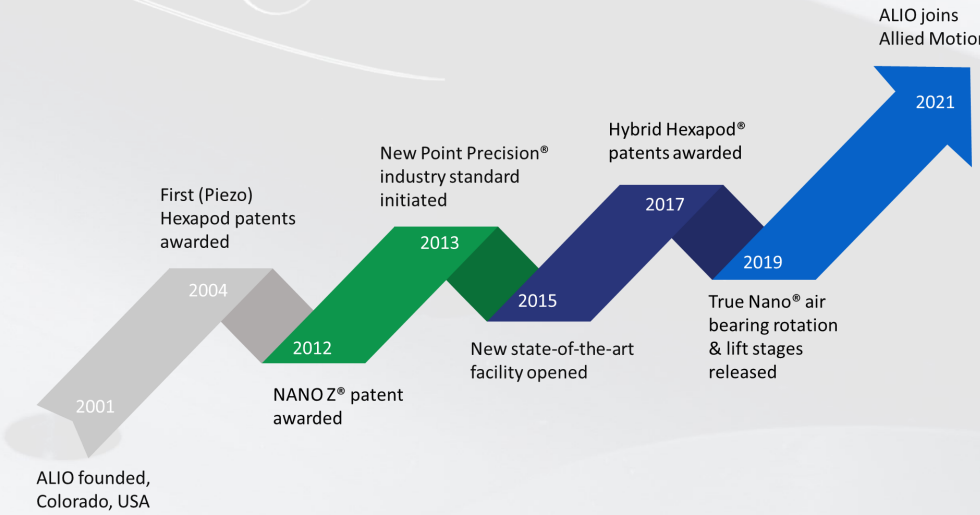
If you are not an expert in motion control, we have the experience to drive your motion control requirements and exceed your expectations. We nurture a partnership relationship with our customers to ensure you have the opportunity to use our 20-year plus expertise in the development of your motion control solution.

ALIO offers what can be described as a high-end boutique-like service from its world-class facilities in Colorado. While providing an extensive range of off-the-shelf products — including Hexapod robotic systems, air bearing systems, and linear and rotary nano-precision systems (with both mechanical and air bearings guides) — we also customize solutions, using our experience to create innovative cutting-edge motion control systems for your specific applications. Our goal is always optimized solutions, within budget, and on time!

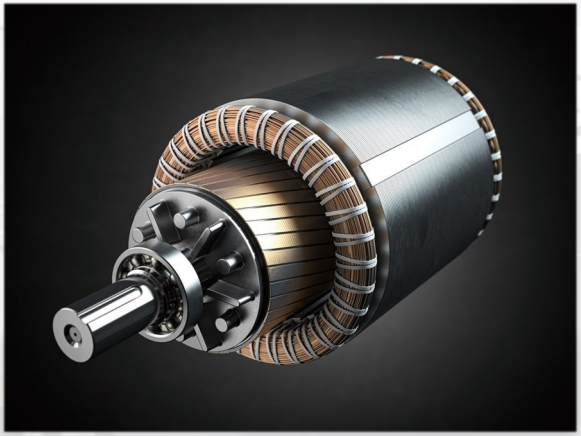
To achieve the precision and quality that our customers demand, we make everything under one roof in our state-of-the-art advanced machine shop, using cutting-edge technologies in controlled environments to ensure the production of optimized motion control solutions. ALIO has 100%-part verification which is unique in the motion control industry.

With design, machining, metrology, manufacturing, and assembly teams all working together, ALIO nurtures cross-company collaboration every day. This allows us to be flexible and nimble as we work with our customers to provide the ultimate in high quality ultra-precise solutions.

Where other companies see obstacles and problems, we see opportunities and solutions, and we are supremely precise.



Industrial Automation & Laser Processing



Industrial Manufacturing

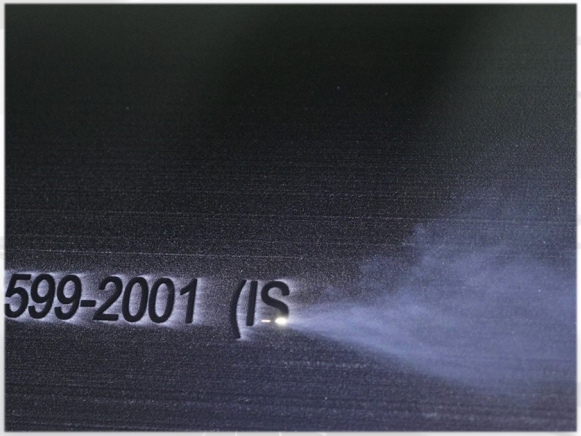
Achieving competitive advantage in exacting specialized industrial manufacturing scenarios requires the use of the right motion control tools. Take a look at the production of motors using electromagnetic components. In such a scenario, an efficient coil with a high fill factor minimizes not only the amount of material and volume required for a given linear motor, wound electromagnetic component, or sub-component, but simultaneously improves the heat conductivity of the winding. In ultra-high-end industries like this, it is vital to use the best quality motion control products available, and to have available highly-customizable products and processes.

ALIO provides monolithic, open-center X, Y, Z stages for such applications, promoting high speed, high throughput, and low friction in a small footprint, scan times being reduced allowing better pre-scan images.

Laser Machining/Processing

Modern laser processing machines can cut complex shapes, but they are usually limited to working in 2D, meaning when more complex cuts are needed, it is necessary to cut in one dimension, turn the part and cut again. This process is time consuming and costly. The accuracy, repeatability, and speed requirements of high-power laser operations demand the employment of five degree of freedom motion control solutions that are capable of positioning and orientating the target with respect to the laser(s) target interaction point with high accuracy and precision again and again.

To achieve this, ALIO uses 6D point precision to validate the 6D repeatability performance on its single and multi-axis motion control systems. Point Precision® in multi-axis movement allows for the creation of more complex shapes, industry-leading flatness, and straightness which decreases the risk of burning the material being processed.

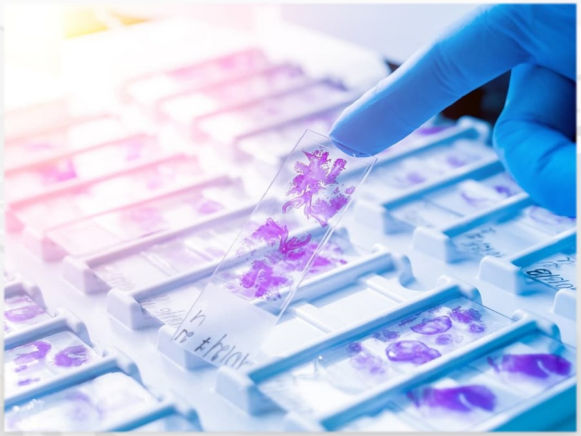


Laser Inscription

Laser inscription is vital when products, parts, or components need to be traced or identified. It can be used to add inscriptions or identifying marks to a range of materials including natural / organic materials, plastics, metals, coated metals, stone, and glass. A particular and important application is the inscription of diamonds. Without causing any damage, a micro-laser beam is used to etch a microscopic inscription on the girdle of the diamond. Most laser marking systems are restricted to operating on a two-dimensional plane, and because of this can only scan on the X and Y axis, and also lack the ability to process materials that have a high hardness or low ignition point.

Using ALIO's compact X,Y,Z motion control systems is the answer, which exhibit smooth travel, low friction, high stiffness and low dither which all enhance the clarity and versatility of the inscription.

Life & Health Sciences



Digital Pathology

Digital pathology is becoming a mainstream option for routine diagnostics, faster whole slide image scanning being the key. However, state-of-the-art technical implementation of whole slide imaging in routine diagnostics is complex. Typically, pre-scans of the whole slide at low-resolution are performed, and only tissue detected on the pre-scan is then scanned at high-magnification to reduce cycle times. Therefore, tiny tissue particles might elude automatic inclusion for final scanning and would be lost to evaluation.

ALIO provides monolithic, low-profile, open-center X, Y, Z electromagnetic driven stages for such applications, promoting high speed, high throughput, and low friction in a small footprint, scan times being reduced allowing better pre-scan images.

Genome Sequencing

Genomics research allows the detailed understanding of the genetic components of all the organisms. When undertaking genome sequencing, researchers are confronted by high cost and low throughput issues, and the problem of handling massive data sets. Automation is a particularly challenging element in the complex instrumentation used, but has the ability to make a vital contribution to cost control. Even minor variations in the stage velocity or drift of the trigger clock can cause poor imaging.

ALIO promotes increased throughput, reduced run time, and lower costs per run coupled with high quality and repeatable imaging by creating a smoother, continuous scan process using a monolithic XY stage and a low friction vertical Z-stage for focusing.

Medical & Clinical Devices

Medical and clinical devices such as rigid or video endoscopes for diagnostic imaging provide reliable diagnoses, and besides requiring perfectly aligned mechanical and optical parts, need hermetically sealed constructions for sterilization methods like autoclaving. To guarantee pin-sharp images and the safety of patients, utmost care in production is a must. Products need to exhibit low friction, low particle generation, are easy to access and clean, and maintains the highest precision. Highly flexible programming enables 4K (and beyond) image quality even using the tiniest and angled endoscopes thanks to the unique ranges and precision offered by the broad product portfolio.

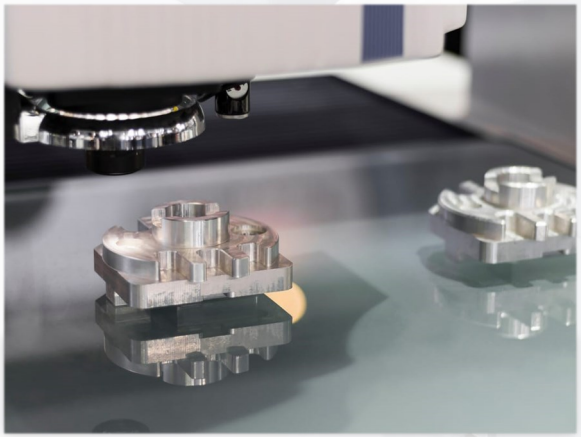
ALIO provides the Angulares Hybrid Hexapod for such applications, which accommodates large XY movement to shift the instrument from process step to process step.

Metrology & the Measurement Industry

Optics Testing, Assembly & Calibration

Camera array modules, translational OIS, telescopic integrated lenses for miniature cameras (used in everyday products like cell phone cameras and drones) consist of various lenses. The industry trend is towards higher resolution 4K and 8K lenses in smaller and smaller areas, requiring increased precision in all 6 motion axes to achieve these combined objectives. Precise positioning of each lens is crucial for sharp, distortion-free images. As all lenses have different diameters, a highly flexible system with multiple tool-center points is needed allowing the various components to be handled precisely and reliable, thereby cutting down tool costs, production time, and scrap.

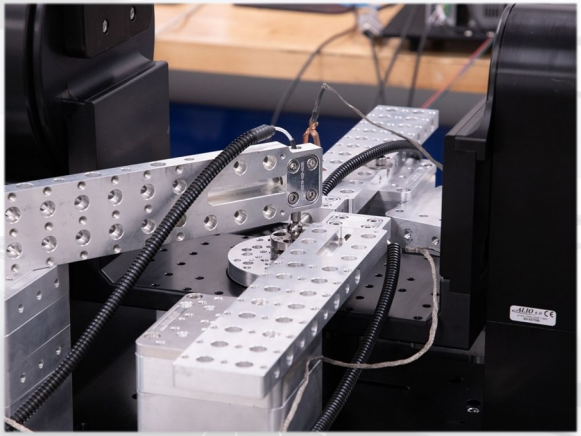
For such applications, ALIO has developed the Mini Hybrid Hexapod® which is ideal for automated lens and camera alignment/ bonding to CCD arrays. Any application requiring 6-degrees of freedom positioning with nanometer/arc-sec levels of incremental motion and repeatability is a good fit for this motion control system where product sensor resolution improvements are driving the need for higher precision.



Measurement & Inspection Tools

Today's metrology systems require rapid measurement of complex part geometries such as bores, undercuts, edges and chamfers, and precise inspection of the most intricate parts. 2D data or partial coverage of a part are often not sufficient anymore even for large parts. For market-leading large FOV 3D metrology tools, the best sensors and encoders can only achieve their required accuracy when the underlying motion system is at least as good or an order of magnitude better.

For such applications, ALIO provides near air-bearing performance crossed roller bearing XY Nano Metrology® stages with up to 450mm travel range. These stages use DC Servo linear motors with unmatched motion performance with 6-D precision of less than +/- 250nm. In other words, the volumetric bi-directional repeatability of any point is within a sphere of 500nm or less.

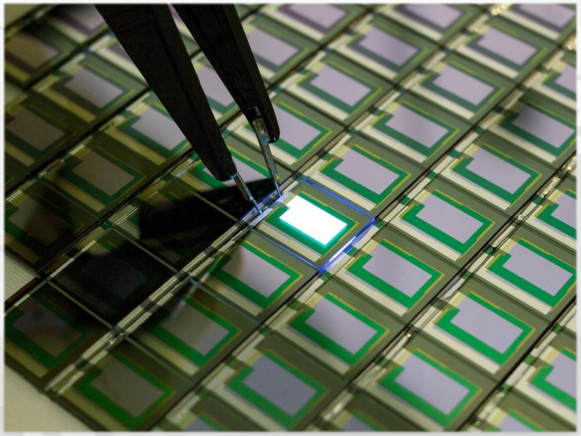


Nano Metrology/Sensor Calibration

New and better metrology sensor designs have created the demand for nanometer-capable stages moving a sample or sensor over several hundred millimeters. Perfect flatness and point repeatability are required by today's measurement systems, allowing measurements with sub-micron accuracies. The motion systems moving these sensors require an even higher precision — ideally an order of magnitude more precise than the sensor itself.

ALIO provides its vertical Z-stages and monolithic XY bases. ALIO's uniquely designed Z-stage provides a completely linear-based vertical solution with near-air-bearing performance, order of magnitude more precise than traditional Z-wedge solutions.

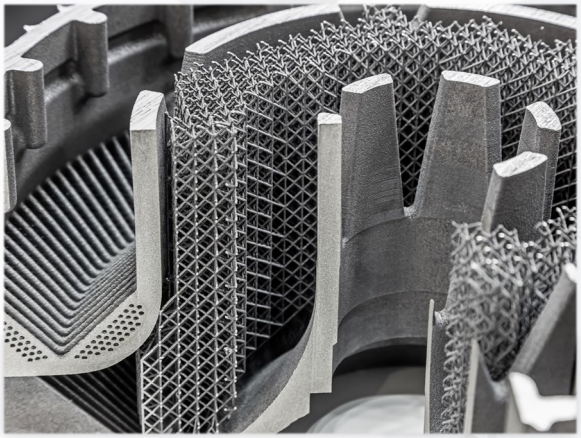
Photonics, Micromachining, Assembly & Testing



FPD, (O)LED Display Manufacturing

As the Micro-LED market gears up for mass production, the focus is shifting to the two major challenges that slow down commercialization — low yield and high cost. Since the chip size of Micro LEDs can be as small as a single micron, existing inspection equipment is inadequate in many respects. Many standard tools simply don't provide high enough resolution. Moreover, with the smaller pixel sizes, there is also a dramatic rise in the number of pixels that need to be processed during inspection. Test technologies are therefore emerging such as electroluminescence (EL) which is able to identify a great number of defects.

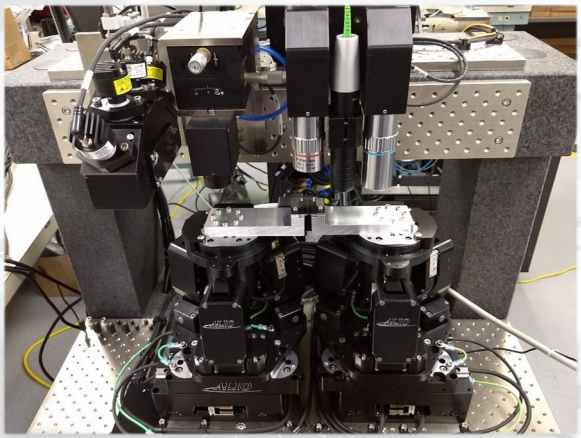
EL tests LED chips by electrical excitation, which requires physical probing of the electrical contacts, and since Micro LED chips are extremely small it is becoming increasingly challenging. Reaching the "point of interest" within a few nanometers is key to ensuring the LED chips don't get damaged during the EL test. With ALIO's vast experience delivering highly repeatable stages with unrivalled point precision, not only is this possible, but throughput thanks to the optimized motion properties can be increased.



Micromachining & Additive Manufacturing

Additive manufacturing (AM) has long disrupted the prototyping stage of product development, but recent advances in speed of operation, improved materials, and optimization software, now see AM becoming a disruptive force in production scenarios. Today in many instances AM is a cost-effective and timely alternative to conventional production technologies. AM is the cornerstone of future digital production infrastructure and is a key driver in the Industry 4.0 revolution. AM promotes design freedom and stimulates the creation of hitherto impossible to achieve geometric complexity. It also has the ability to localize production and overcome issues associated with unwieldy international supply chains.

Motion systems play a huge role in promoting the flexibility, speed, and product quality delivered by any AM technology. ALIO's portfolio represents a one-stop-shop covering all possible positioning requirements from a simple XY-stage, 6D Hybrid Hexapods, gantries, or fully assembled motion solutions.



Photonics & Fiber Alignment & Assembly

The use of LEDs and laser chips, optical glass, detectors and image sensors, lenses, prisms, optical filters, gratings, and optical fibers is becoming more and more common in various vertical markets. Associated manufacturing processes for products including such components may include the alignment and attachment of free-space optics, the attachment of pigtails, fiber arrays, and waveguides coupled to various types of light source, and the assembly and testing of hybrid opto-electronic devices and high-power laser diodes. ALIO's hybrid planar and point-precision motion system design is two orders of magnitude more precise than any competitive solution.

All such processes represent cutting-edge, high-precision production systems that utilize advanced automation approaches, regardless of the device material and target application. Modular system architectures are required, so that exploratory, proof-of-process development — as well as high-volume manufacturing requirements and anything in-between — are addressable. ALIO's hybrid planar and point-precision motion system design is two orders of magnitude more precise than any competitive solution.

Semiconductor Industry

Lithography

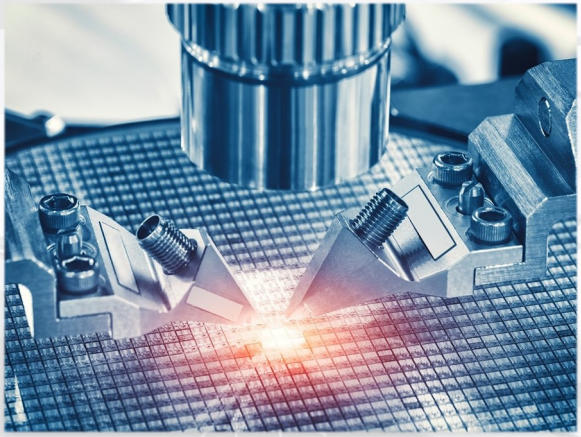
Stepper lithography tools introduced a new level of resolution in the history of integrated circuit (IC) manufacturing, and are still broadly used as they keep costs and complexity fairly low in comparison to scanning lithography, even though scanning lithography has a few obvious advantages, including higher speed, larger image fields, and scan averaging of aberrations. Traditional 1X stepper lithography tools are somewhat limited in throughput as they require an excessive amount of time to ramp up stage speed, decelerate stage speed, then stop and settle. Multiply that time with the several dozens of shots needed in the lithography process, and the resulting throughput is rather low.

ALIO's patented air bearing stages enable the introduction of a new level of smooth, continuous serpentine step-and-scan technique eliminating stops and wasted time.

Metrology (Wafer/Mask Inspection)

As ICs are made for more and more complex applications, the more sophisticated metrology tools are needed with high-volume manufacturing in mind. Position control for product wafer measurements, compliance for semiconductor production clean room operation, highly reliable machine performance and low power consumption and cost of ownership are all important. ALIO is adept at addressing these challenges, and can develop customized solutions for specific customer applications. One such was a wafer metrology low-profile XY-theta stage with large open aperture, finding a novel design approach for an open frame stage where the design doesn't allow a centered drive to get a symmetric distribution of the force onto the axis.

ALIO builds open center XY Nano Metrology stages with up to 300mm aperture and with 3-Sigma, 6-D (linear, straightness, flatness, pitch, yaw and roll) and bi-directional repeatability of less than +/- 250nm.

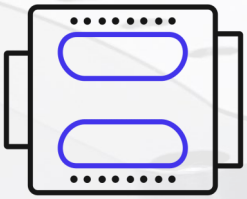


Microelectronics Assembly & Testing

In sensitive application areas, such as medical, communications, automotive, and aerospace technology, reliability of the underlying electronic systems is of utmost importance. Therefore, the semiconductor industry and manufacturers of electronic components and systems carry out thorough electrical tests on their products, in order to guarantee their failsafe operation.

ALIO provides vacuum chuck rotary stage linear drives which allow for extremely precise positioning of the test probes for any package shape, any package size, and wafers. Independently controlled stages enable more flexibility for various electronic test scenarios and significantly reduce handling efforts and test times.

Linear Motion Systems



ALIO's linear products have been designed and manufactured to have no equal in terms of performance and reliability. ALIO's "mechanical" bearing stages can perform at a level of precision that alternative suppliers struggle to match with their "air" bearing stages. ALIO's focus on 6-D Nano Precision® only — while others design and build to the 2-D world of planar repeatability and accuracy — keeps the company on the leading edge. All of the ALIO linear stage product families exhibit world class performance, component choice being dictated by the demands of exacting applications and cost sensitivity.

ALIO does not build legacy products and is acutely aware of the 6-dimensional errors associated with simple linear motion. ALIO designs and manufactures with these issues in sharp focus with unique manufacturing techniques and leading-edge components tested to NIST traceable nano results.

XY Travel	Velocity	Linear Resolution	Bi-Directional Repeatability	Displacement Accuracy	Find Products & Details
30mm – 450mm	0.3 – 1.0 m/sec	<5nm	Down to +/- 30nm	~<1.0µm	

Linear X Stage

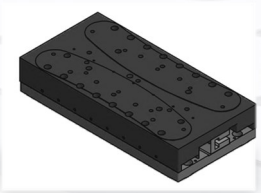
Asymmetrical, Monolithic XY Stage

Enclosed, Monolithic XY Stage

Open-centered, Monolithic XY Stage

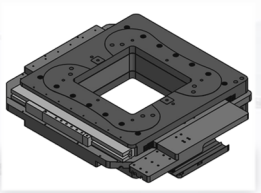
Enclosed Monolithic XY

Low-profile Enclosed XY

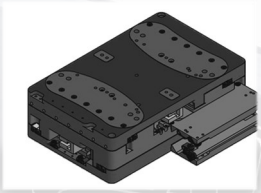


Linear X

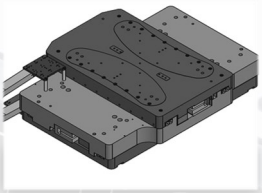
Low-profile Linear X



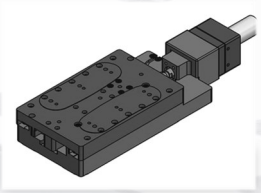
Open-Centered, Monolithic XY



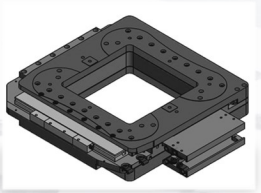
Asymmetrical Monolithic XY



Large Asymmetrical Monolithic XY



Linear X with Precision Ball



Low-profile Open-Centered XY

		Scanning / Smooth Continous Movement	Step and Settle	No Movement on Power Loss	Compactness	Total Cost	Long Travel Range	Aperture / Open Center	Precision	Throughput
Enclosed Monolithic XY AI-LM-(TRAVEL)00-XY	XY	●	●		◑	○	◑		●	◑
Low-profile Enclosed Monolithic XY AI-CM-(TRAVEL)00-XY	XY	●	●		●	○	○		●	◑
Linear X AI-LM-(TRAVEL)00	X	●	●		◑	○	◑		●	◑
Low-profile Linear X AI-CM-(TRAVEL)00	X	●	●		●	○	○		●	◑
Open-Centered Monolithic XY AI-LM-(TRAVEL)00-(THRU)E-XY	XY	●	●		◑	○	◑	●	●	◑
Low-profile Open-Centered Monolithic XY AI-CM-(TRAVEL)00E-(THRU)-XY	XY	●	●		●	○	○	●	●	◑
Asymmetrical Monolithic XY AI-SLM-(TRAVEL_X)x(TRAVEL_Y)-XY	XY	●	●		◑	○	○	○	●	◑
Large Asymmetrical Monolithic XY AI-LM-(TRAVEL_X)x(TRAVEL_Y)-XY	XY	●	●		◑	○	◑	○	●	◑
Linear X with Precision Ball Screw AI-VBS-(TRAVEL)00-(BRAKE OPTION)	X	○	◑	◑	○	◑	◑		◑	○

● Best Fit
◑ Good Fit
○ Fit

Z-Lift & Vertical Stages

ALIO Industries' Z-Lift motion platforms were created to address the unavoidable inaccuracies of Z-wedge vertical stages, as well as to reduce the footprint and improve performance of linear stages mounted in the vertical orientation. Every component in a motion stage adds to the total error. Since Z-wedges have a minimum of three machined components with complex angles, three sets of bearings, a motor via a coupling, and an encoder, the result is a very inaccurate stage.

ALIO answers this with a family of very high accuracy, highly repeatable vertical stages.

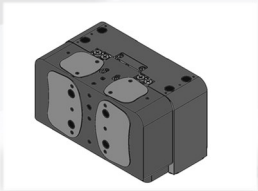
Z Travel	Velocity	Linear Resolution	Bi-Directional Repeatability	Displacement Accuracy	Find Products & Details
6mm – 200mm	0.2 – 1.0 m/sec	<5nm	Down to +/- 45nm	~<1.0µm	

Nano Z® - Dual Voice Coil,Air Bearings

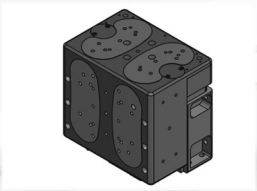
GeoSymmetric Voice Coil Z Stage

High Load and Force Z Stage

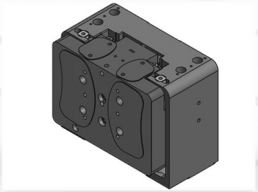
Long Travel Z Stage



Voice Coil Z, Pneumatic Cylinder

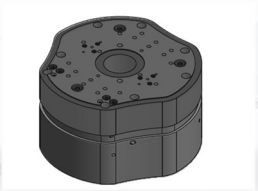


High Force Voice Coil Z

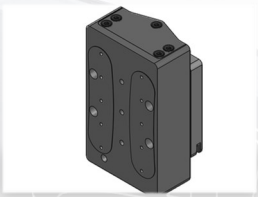


Voice Coil Z, Magnetic Spring

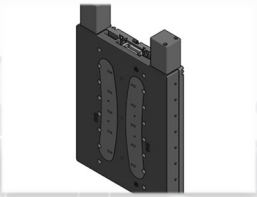
Voice Coil Z, user-swappable



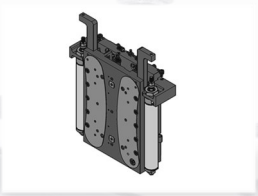
Nano Z® - Dual Voice Coil, AB



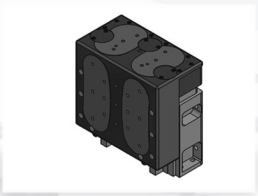
Linear Motor, Magnetic Spring



Extra long travel Z



Linear Motor, Pneumatic Cylinder

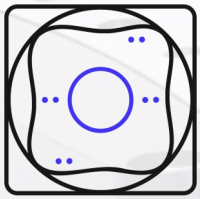


High Load and Force Z

		Scanning / Smooth Continous Movement	Step and Settle	No Movement on Power Loss	Compactness	Total Cost	Long Travel Range	High Force / High Load	Precision	Throughput
Voice Coil Z with Pneumatic Cylinder AI-(MOTOR)-(TRAVEL)00-(FORCE)-Z-CB	Z	●	●		●	●	○	○	●	●
High Force Voice Coil Z with Pneumatic Cylinder AI-(MOTOR)-(TRAVEL)00-(FORCE)N-Z-CB	Z	●	●		●	●	○	○	●	●
Voice Coil Z with Magnetic Spring AI-(MOTOR)-(TRAVEL)00-(PAYLOAD)-Z-MCB-(ORIENTATION)	Z	●	●		●	●	○	○	●	◑
Voice Coil Z with user-swappable Counterbalance AI-(MOTOR)-(TRAVEL)00-Z-SCB	Z	●	●		●	●	○	○	●	◑
Nano Z® - Dual Voice Coil Stage with Air Bearings AI-VC-2400-NANO-Z-AB	Z	●	●		◑	○	○	○	●	◑
Linear Motor driven Z with Magnetic Spring AI-LM-(TRAVEL)00-Z-MCB-(MAX PAYLOAD)	Z	●	●		○	◑	◑	◑	●	●
Extra long travel Z with Magnetic Spring AI-LM-(TRAVEL)00-(PAYLOAD)-Z-MCB-BASE	Z	●	●		○	◑	●	○	◑	○
Linear Motor driven Z with Pneumatic Cylinder AI-LM-(TRAVEL)00-Z-ABCB-(OPTION)	Z	●	●			○	◑	●	●	◑
High Load and Force Z with Pneumatic Brake AI-BSD-(TRAVEL)00-Z-PBRK	Z		◑			◑	●	●	○	○

● Best Fit
◑ Good Fit
○ Fit

Rotary Motion Systems



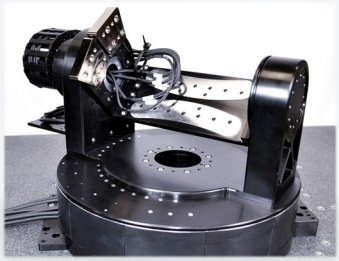
ALIO Industries has also developed TRUE NANO® precision rotary stages to meet and exceed today's demand for high precision rotary motion. ALIO's line of rotary stages continues to expand as the company works with each individual customer on a one-to-one basis to provide customized motion control solutions perfectly aligned to the specifics of particular applications.

Diameter	Torque	Angular Resolution	Bi-Directional Repeatability	Angular Accuracy	Find Products & Details
56 – 312 mm	0.66 – 48 Nm	0.01—0.04 arc-sec	+/- 0.2 arc-sec	Down to +/- 3.0 arc-sec	

Mechanical Bearing Rotary

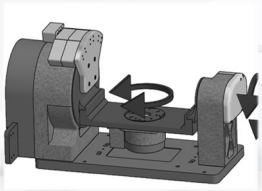
Rotational Air Bearing Stages

Open-Center Rotary Stage

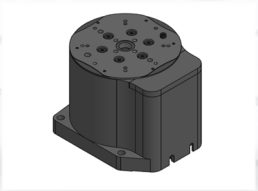


2 Axis Gimbal

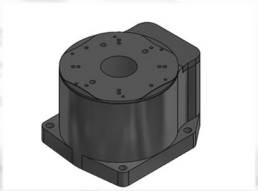
Rotational Air Bearing Stages



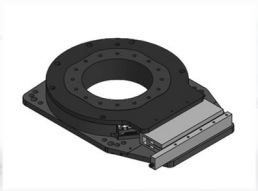
2 Axis Gimbals



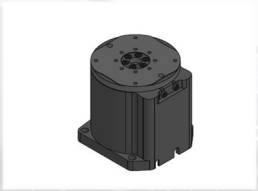
Crossed Roller Bearing Rotary



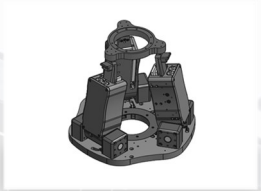
360 degree Angular Contact



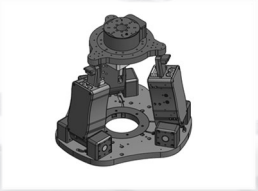
Rotary with Large Aperture



Micron II Rotary



Linear Tripods



Linear Tripods with Rotary

		Scanning / Smooth Continous Movement	Step and Settle	No Movement on Power Loss	Compactness	Total Cost	Long Travel Range	Aperture / Open Center	Precision	Throughput
Rotational Air Bearing Stages AI-TM-(DIAMETER)R-AB	Rot	●	●		○	○	●	○	●	◑
2 Axis Gimbals 2 Axis Gimbal	Gimbal	●	●	◑			◑			
Crossed Roller Bearing Rotary AI-TM-(DIAMETER)R	Rot	●	●		◑	◑	●	○	●	●
360 degree Angular Contact Bearing Stages AI-TM-(DIAMETER)RA	Rot	●	●		○	○	●	◑	●	●
Rotary with Large Aperture AI-LM-(DIAMETER)RA	Rot	●	●		●	○	○	●	●	◑
Micron II Rotary AI-TM-(DIAMETER)RA-UII	Rot	●	●		○	◑	●	○	◑	●
Linear Tripods AI-TRI-LM-(Z TRAVEL)00-(OPTION)	3 DOF	●	●	○	◑	◑	●	◑	●	●
Linear Tripods with integrated Rotary AI-TRI-LM-(Z TRAVEL)00-(R DIAMETER)-(OPTION)	4 DOF	●	●	○	◑	◑	●		●	●

● Best Fit
◑ Good Fit
○ Fit

Hybrid Hexapod

ALIO's patented next generation Hybrid Hexapod® takes a different approach to traditional 6 Degree of Freedom (6-DOF) positioning devices, and exhibits much higher performance at extremely competitive prices. The Hybrid Hexapod® combines a precision XY monolithic stage, tripod, and continuous rotation theta-Z axis. This renders traditional hexapod kinematics obsolete, with orders-of-magnitude improvements in precision, path performance, speed, stiffness and a larger work envelope with virtually unlimited XY travel, and fully programmable tool-center point locations.

The Hybrid Hexapod® has less than 100 nm 3-Dimensional 6 axis Point Precision® repeatability, making it an essential technology for mission critical applications in the laser processing, optical inspection, photonics, semiconductor, metrology, and medical device sectors, and indeed all micro-machining projects.

Max. XY/Z/A/B/G	Max. Linear, Ang. Velocity	Linear Resolution	Bi-Directional Repeatability	Displacement Accuracy	Find Products & Details
Unlimited/60mm /60°/60°/360°	0.5m/s, 180deg/s	<5nm	Down to +/- 80nm	~<1.0µm	

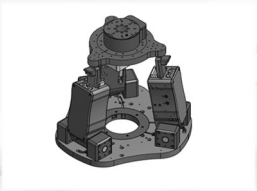
MINI Hybrid Hexapod®

Standard Hybrid Hexapod®

High Load Hybrid Hexapod®

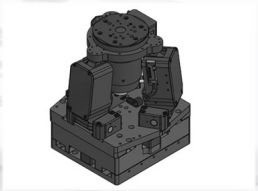
Angulares Hybrid Hexapod®

Linear Tripods

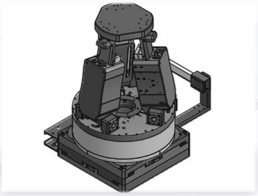


Linear Tripods with Rotary

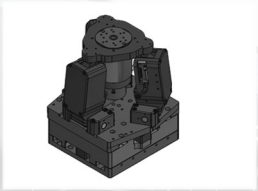
Standard Hybrid Hexapods



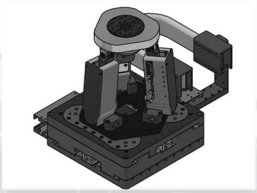
High Torque Hybrid Hexapods



High Load Hybrid Hexapods



Miniature Hybrid Hexapods



Angulares® - Extra large Tip/Tilt

		Scanning / Smooth Continous Movement	Step and Settle	No Movement on Power Loss	Compactness	Total Cost	Long Travel Range	High Force / High Load	Precision	Throughput
Linear Tripods AI-TRI-LM-(Z TRAVEL)00-(OPTION)	3 DOF	●	●		◑	◑	●	○	●	●
Linear Tripods with integrated Rotary AI-TRI-LM-(Z TRAVEL)00-(R DIAMETER)	4 DOF	●	●		◑	◑	●	○	●	●
Standard Hybrid Hexapods AI-HH-(XY TRAVEL)XY-(Z TRAVEL)Z-(R DIAMETER)R	6 DOF	●	●		◑	◑	●	○	●	●
High Torque Hybrid Hexapods AI-HH-(XY TRAVEL)XY-(Z TRAVEL)Z-(R DIAMETER)RGR	6 DOF	●	●	●	○	○	◑	●	◑	○
High Load Hybrid Hexapods AI-6D-(XY TRAVEL)XY-(R DIAMETER)R-(Z TRAVEL)Z	6 DOF	●	●	○		○	◑	●	●	◑
Ball Screw Driven Hybrid Hexapods AI-HH-BSD-(XY TRAVEL)XY-(Z TRAVEL)Z-(R DIAMETER)R	6 DOF	●	●	○	○	●	◑	◑	◑	◑
Miniature Hybrid Hexapods AI-HH-(XY TRAVEL)XY-(Z TRAVEL)Z-(R DIAMETER)RT	6 DOF	●	●	○	●	●	◑	●	●	◑
Angulares® - Extra large Tip/Tilt AI-HH-30D-(XY TRAVEL)XY-(Z TRAVEL)Z-(R DIAMETER)R	6 DOF	◑	◑			○	●	●	◑	◑

● Best Fit
◑ Good Fit
○ Fit

Micron 2 (µII) Stages

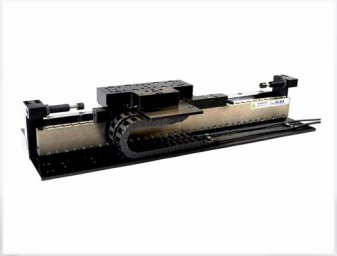
ALIO has introduced its new Micron 2 (µII) motion systems family to compete in the micron-level motion control market, where the demand is for low-cost, mid-precision, reliable, long travel stages. As with all ALIO's Micron 2 (µII) motion systems are designed using the company's uncompromising standards of "quality first" thereby ensuring long-term reliable operation.

The Micron 2 (µII) recirculating ball rail bearing stages come as standard in sizes of 100mm up to 2 meter thus providing the end-user a solution for a large variety of applications. The Micron 2 (µII) motion systems family is a robust, powerful line that is designed to be used either stand-alone, or as a top axis of an integrated solution.

XY Travel	Acceleration	Linear Resolution	Bi-Directional Repeatability	Displacement Accuracy	Find Products & Details
100mm – 2000mm	Up to 4G	<5nm	Down to +/- 0.5µm	~<1.0µm	

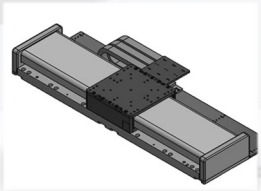
Standard, Dual Ball Rail X Stage

High-Force and Payload X Stage

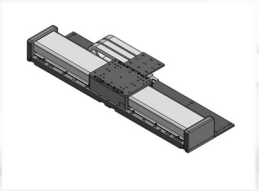


Extra Large Ball Rail X Stage

Slim (naked) Single Ball Rail X Stage

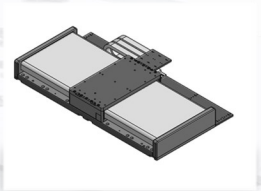


Dual Rail Linear X

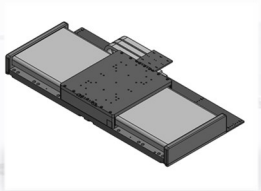


Slim Rail Linear X

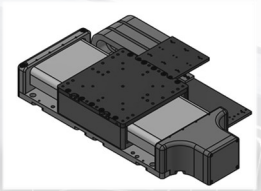
Slim (Naked) Rail Linear X



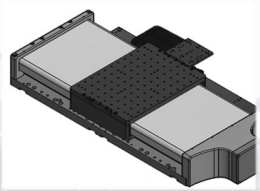
Wide Dual Rail Linear X



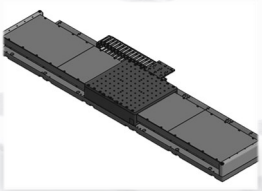
Large Carrier Linear X



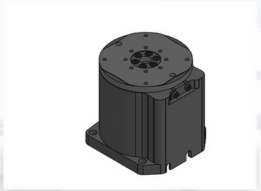
Ball Screw Driven X



High-Force, High-Payload X



Extra Large Linear X

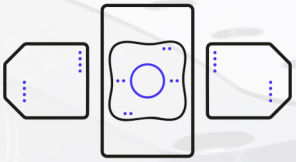


Micron 2 Rotary Stages

		Scanning / Smooth Continous Movement	Step and Settle	No Movement on Power Loss	Compactness	Total Cost	Long Travel Range	High Force / High Load	Precision	Throughput
Micron 2 Dual Rail Linear X AI-LM-(TRAVEL)00-UII	X	◑	◑		○	◑	●	◑	◑	◑
Micron 2 Slim Rail Linear X AI-LM-(TRAVEL)00-UII-S	X	◑	◑		○	◑	●	○	○	◑
Micron 2 Slim (Naked) Rail Linear X AI-LM-(TRAVEL)00-UII-SN	X	◑	◑		○	◑	●	○	○	◑
Micron 2 Wide Dual Rail Linear X AI-LM-(TRAVEL)00-UII-W	X	◑	◑		○	◑	●	◑	◑	◑
Micron 2 Large Carrier Linear X AI-LM-(TRAVEL)00-UII-WL	X	◑	◑		○	◑	●	◑	◑	◑
Micron 2 Ball Screw Driven X AI-SBS-(TRAVEL)00-UII-(BRAKE OPTION)	X		○	●	○	●	●	●	○	●
Micron 2 High-Force, High-Payload X AI-XBS-(TRAVEL)00-UII	X		○	●	○	●	●	●	○	●
Micron 2 Extra Large Linear X AI-(TRAVEL)00-UII-XB	X		○	●	○	●	●	◑	○	●
Micron 2 Rotary Stages AI-TM-(DIAMETER)RA-UII	Rot	●	●		○	◑	●	○	◑	●

● Best Fit
◑ Good Fit
○ Fit

Air Bearing Systems



ALIO Industries has developed leading-edge 6-D Nano Positioning® air bearing motion systems for a wide range of applications in manufacturing, inspection/repair, and metrology. With several patent-pending designs for Planar and Nano Z®, ALIO is well-positioned for the next generation application demands of TRUE NANO® precision in photovoltaic, semiconductor, ink jet deposition, lithography, and optical inspection applications.

XY Travel

200mm – 1000mm

Velocity, Acceleration

>1.0 m/sec , >1G

Payload Capacity

20kg (80kg Opt.)

Bi-Directional Repeatability

Down to +/- 100nm

Displacement Accuracy

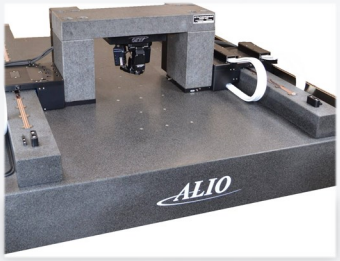
<0.5µm

Find Products & Details

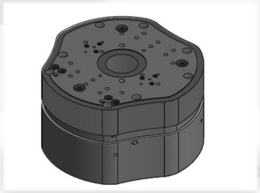
Planar XY Air Bearing Stage

Nano Z® - Dual Voice Coil,Air Bearings

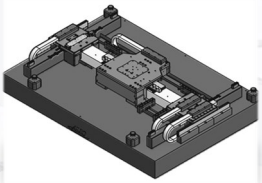
Rotational Air Bearing Stages



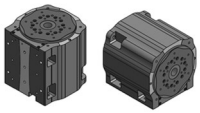
Long Travel Linear Air Bearing Stage



Nano Z® - Dual Voice Coil, AB



Planar XY Air Bearing Stages

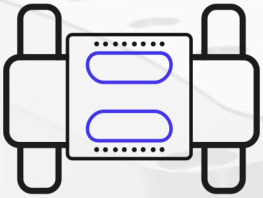


Rotational Air Bearing Stages

		Scanning / Smooth Continous Movement	Step and Settle	No Movement on Power Loss	Compactness	Total Cost	Long Travel Range	Aperture / Open Center	Precision	Throughput
Nano Z® - Dual Voice Coil Stage with Air Bearings AI-VC-2400-NANO-Z-AB	Z	●	●		◑	○	○	○	●	◑
Planar XY Air Bearing Stage AI-LM-(TRAVEL)00-ABL	XY	●	●				●	◑	●	◑
Rotational Air Bearing Stage AI-TM-(DIAMETER)R-AB	Rot	●	●		○	○	●	○	●	◑

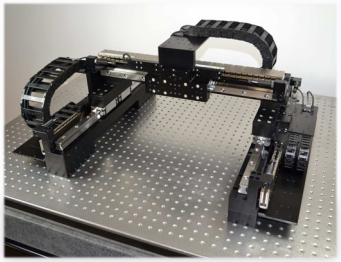
● Best Fit
◑ Good Fit
○ Fit

Cartesian Gantries



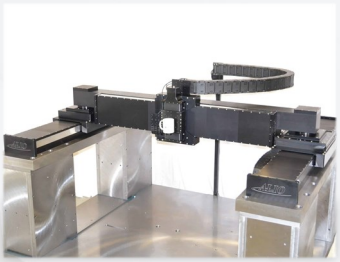
A gantry robot consists of a manipulator mounted onto an overhead system and allows movement across a horizontal plane. Gantry robots are also called linear or cartesian robots and are typically large systems built with linear guide rails that undertake pick and place actions, and they can also be used in applications such as welding. Cartesian gantries are relatively simple to program when compared to alternative motion control solutions, and in addition, they are not limited by floor space constraints. ALIO's cartesian gantries are characterized by large work areas and superior positioning accuracy.

XY Travel	Acceleration	Linear Resolution	Bi-Directional Repeatability	Displacement Accuracy	Find Products & Details
200mm –2000mm	1.5 – 3.5 G	<5nm	Down to +/- 30nm	~<1.0µm	



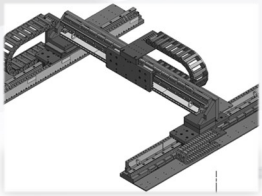
Gantry on Breadboard

Gantry with Yaw Compliance and Z

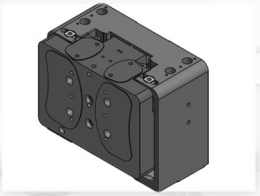


Long Travel Gantry

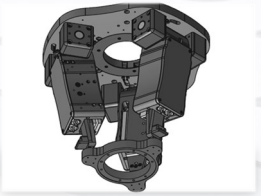
L shaped, half Gantry



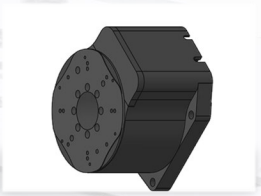
Cartesian Gantries—SNH2



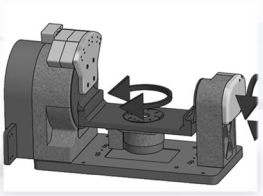
Z-axis options



Inverted Tripod Options



Rotary-axis options



Dual rotary options

Trunnion product support dual rotary options

- 104mm to 208mm diameter
- Up to 20Nm torque rating
- Kinematic equations included with ALIO controller
- Air purge for contaminant protection Position trigger capable with ALIO controller

Inverted Tripod Options

- Linear motor or screw drive
- Kinematic equations included with ALIO controller
- High precision, closed-loop feedback
- Counterbalance biased AWAY from collision (linear motor driven solutions)
- Position trigger capable with ALIO controller

Z-axis options

- Linear motor or screw drive
- Linear or rotary brake available
- Air or pneumatic counterbalance
- Counterbalance biased AWAY from collision
- Position trigger capable with ALIO controller

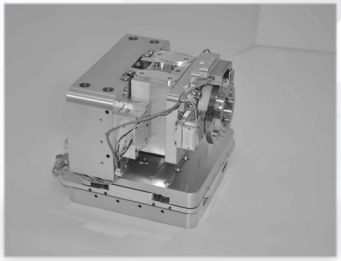
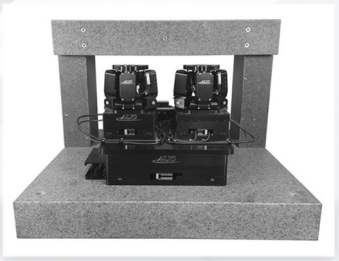
Rotary-axis options

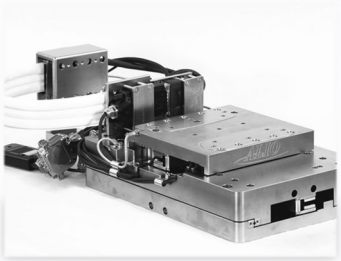
- 56mm to 208mm diameter
- Up to 20Nm torque rating
- Kinematic equations included with ALIO controller
- Air purge for contaminant protection
- Position trigger capable with ALIO controller

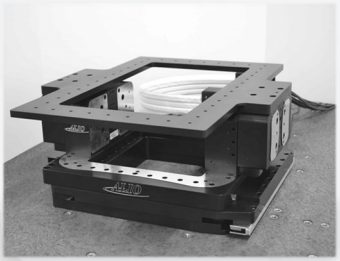
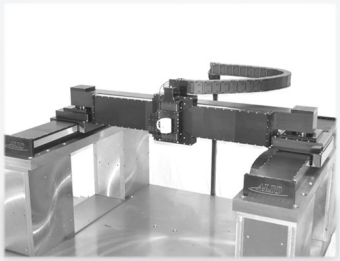
Custom Solutions

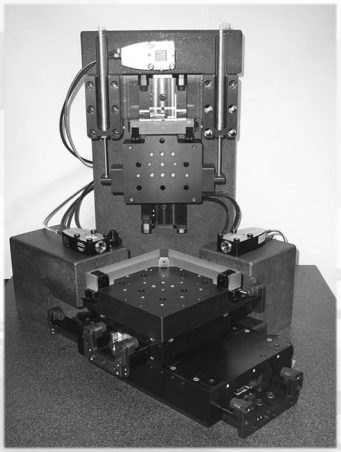
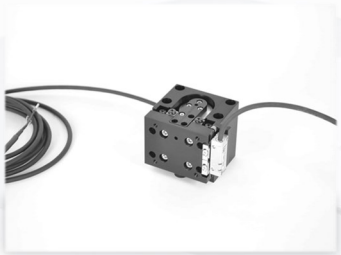
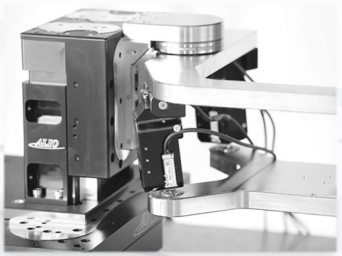
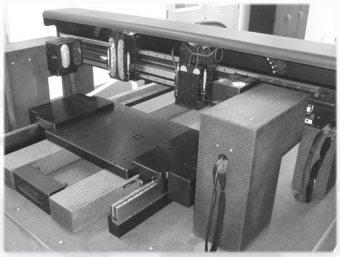
It is ALIO's ability to truly customize its core motion control solutions that sets it apart from alternative solution providers, offering significant value added by exactly matching OEM customers' needs as well as pushing the envelope for new world nano-precision applications. ALIO's on-going focus on exceeding OEM requirements helps its customers become leaders in their respective industry sectors.

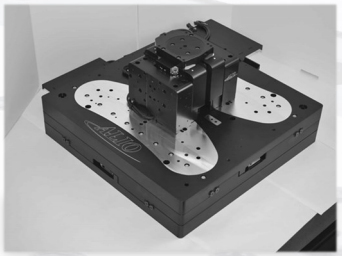
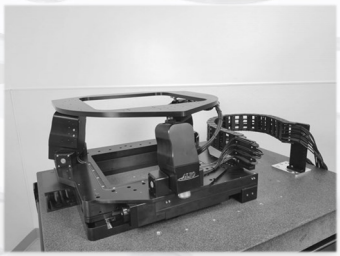
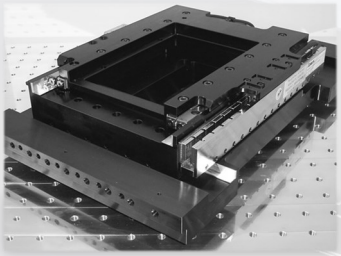
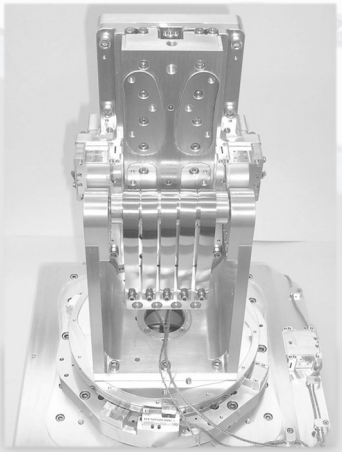
Customers approach ALIO for unique applications due to the company's long track record of successfully delivering complex prototypes that meet or exceed specifications the first time.

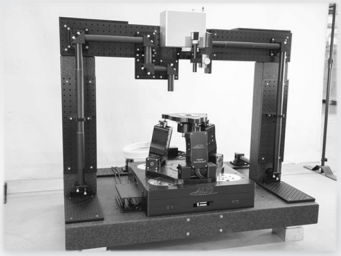
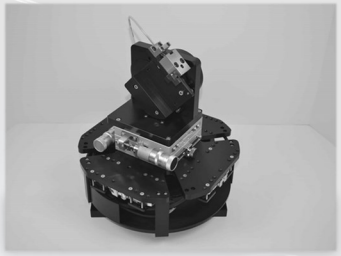
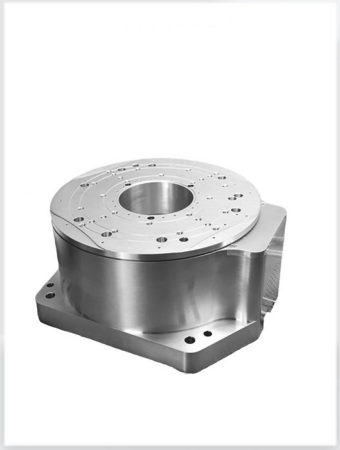
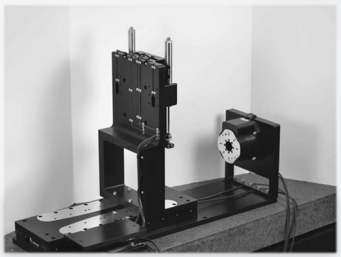
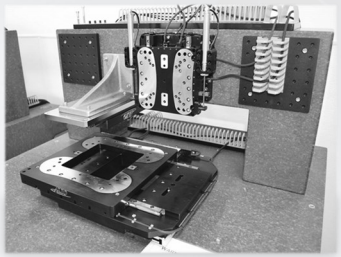






Glossary

True Nano Positioning® and True Nano®

Real positioning performance at the nanometer level based on fully documented NIST traceable proof of performance to registered standards. Resolution means absolutely nothing in the True Nano® world.

6-D Nano Precision®

6-D refers to the 6 dimensions of motion; linear, straightness, flatness, pitch, yaw and roll. Nano Precision refers to documented proof of performance at or below the +/- 450 nm level. 6-D Nano Precision® means the documented proof of performance over all 6 degrees of freedom of a body in motion at the nanometer level of precision.

Point Precision® or 6-D Point Precision®

Point Precision® and 6-D Point Precision® both define bi-directional repeatability of all 6 degrees of freedom (linear, straightness, flatness, pitch, yaw and roll) to a single point of precision in space for a single motion stage, or in ALIO's case we push this singular stage approach even further with our monolithic XY stages which have combined 6-D point precision at the nanometer precision level of both axes combined. Without 6D point precision, claims of accuracy and repeatability are at best pointless, and at worst knowingly misleading.

Nano Metrology®

Nano Metrology® was registered in deference to the evolution and novel designs of metrology sensors which created a need for better stages to move the sample or sensor. ALIO introduced the novel idea of nanometer precision of straightness of travel to reduce the uncertainty of measurement, and has the ability to measure at the nanometer level of uncertainty which include motion and sensor combined error quotients.

Nano Z®

The Nano Z® trademark was born out of work that ALIO undertook in the semiconductor industry on a planar XY air bearing and an air bearing Z stage for wafer manufacturing and metrology. The Z lift stage design was so novel that ALIO trademarked its name, and it reinforces the company's ability to move in Z, vertical, or lift a part with nanometer-level precision.

Hybrid Hexapod®

Hybrid refers to a new and sometimes novel approach of combining two platforms that improve the performance of each design as a whole. Hexapods have been known for years as a 6-axis parallel kinematic structure. ALIO's hybrid approach — which consists of a monolithic XY base, tripod, and (if required) a 360 degree rotary stage — is 2 orders of magnitude more precise than all other hexapods built today (or tomorrow) simple based on basic physics of motion and the error quotient.

A Part of Allied Motion Technologies, Inc.

ALIO Industries joined the Allied Motion family of motion control companies in 2021.
Allied Motion Technologies, Inc. (“Allied Motion”) is a global company that designs, manufactures and sells precision and specialty motion control components and systems used in a broad range of industries. While serving a very broad base of industries, the primary target markets are the Vehicle, Medical, Aerospace & Defense, Electronics and Industrial markets. The products and solutions support a wide variety of applications in these markets and include brush and brushless DC motors, brushless servo and torque motors, coreless DC motors, integrated brushless motor-drives, gearmotors, gearing, modular digital servo drives, motion controllers, incremental and absolute optical encoders, and associated motion control-related products.

Being a part of Allied Motion benefits ALIO customers as the company is now part of a financially robust international technology corporation with global manufacturing and distribution reach, and the resources to ensure consistent medium- to long-term supply and support. ALIO can also now benefit from Allied Motion’s lean manufacturing and continuous improvement processes, and access to Allied’s international supply chain.

Motion Controllers
Single & multi-axis, standalone & networked

Motor Drives
Single & multi-axis, standalone & networked

& Encoders
Incremental & absolute

Motors
Brush DC, brushless DC, direct-drive brushless, linear brushless

Controls & Networking
Universal gateways, I/O modules, IIoT solutions

Power Quality
Active & passive, line & load harmonic filters

Geared Solutions
Gearmotors — parallel, inline, right-angle, epicyclic

ALIO 6-D

An Allied Motion Company

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