Renishaw

OFFERS ENCODERS FOR WIND TURBINE BEARINGS

Blade pitch adjustment is one of the most critical functions of wind turbine operation, and the giant bearings in the adjustment mechanism can now be manufactured with accuracy typically reserved for small parts, using a new vertical turn/grind machine from Swedish builder KMT Lidköping. The machine combines advanced motion systems with Renishaw optical and magnetic linear and angle encoders on critical axes to achieve form deviation of less than 1 µm on parts 4,000 mm in diameter.

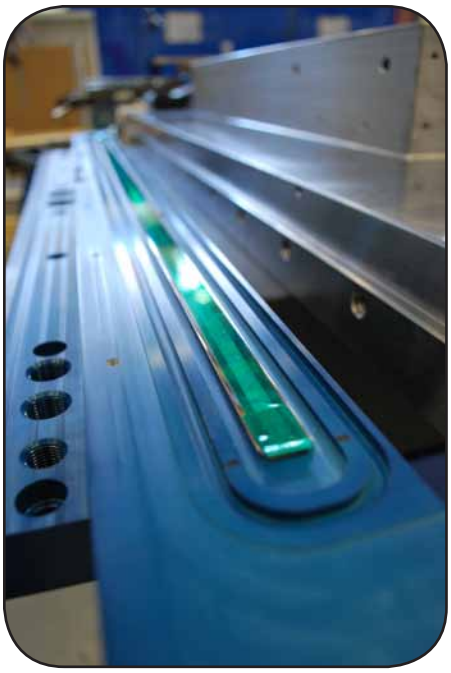
"This is hard turning and grinding, and is very demanding," said Eive Johansson, KMT Lidköping's chief designer. "Positioning accuracy is very important, with a direct effect on the quality of the finished bearings." Prior to the VTG4000, the company's largest machine could accommodate parts up to 600 mm (24 in.) diameter, but the VTG4000 handles diameters in excess of 4,000 mm (157 in.), the size of the largest wind turbine bearings, while providing much greater accuracy.

Linear motors on the linear axes make the VTG4000 fast, and firm hydrostatic guideways increase accuracy. "A standard size machine, using ballscrews on the axes, maintains about a 3 µm form deviation," said Johannson. "This machine maintains form deviation of less than 1 µm with feed resolution in 0.1 µm steps." Linear slides are at the heart of Lidköping machines, and the combination of hydrostatic guideways, air seals and linear motors creates a stiff, accurate, maintenance-free system. "To achieve dynamic stiffness we need high gain, which is linked to the quality of the encoder scales," explained Johansson. "It also makes a big difference that the angle encoders have the scale integrated directly onto the ring."

High Quality Improves Control of Turbine Blades

Pitch bearings allow wind turbine blades to optimize their angle according to wind speed, or create a stall condition in high winds, so the reliability of these bearings is critical to efficient, safe operation.

The multi-tasking VTG4000 is designed to machine these large bearings in a single set up, performing both turning and grinding with two separate heads. The two heads are configured as required, usually grinding/turning or grinding/grinding. The machine's 4.5 m X-axis carries the two heads on opposite sides of the part, and allows both grinding and turning tools to access the outside of the part. With some components weighing more than 35 tonnes, the VTG4000 is very resistant to distortion and thermal variation,



which is aided by closely controlled hydrostatic oil and coolant temperatures. "We've used hydrostatic guideways since the 1970's, and combining them with linear motors gives us a faster, more accurate machine capable of far greater acceleration and deceleration," said plant manager Henrik Jonsson. "When you see that you can move the 25,000 kg rotary axis with your finger, you realize how good the hydrostatic system is."

Johansson first saw the encoders that would end up on the VTG4000 at the EMO show in 2007, and Lidköping put the sensors through rigorous testing. "We compared different scales assembled on our reference slide and selected the one with the best performance," said Johansson. "It was important that the linear encoders have a continuous length of at least 4.5 m, as well as high dirt resistance, and SiGNUM fit these requirements the best. We have fitted them to all four linear slides, and have had no problems. Our rotary table has the same design principle, with hydrostatic radial and axial bearings, air seals and torque motors. We did the same analysis and chose the SiGNUM angle encoders."

Renishaw's LM10 magnetic angle encoders are fitted to the B-axes of the grinding heads. These encoders are exposed to the harsh conditions of the machine environment, but their

non-contact, non-optical design, and sealing to IP68, protects them from the effects of coolant and swarf. The digital or analog output LM10 allows up to 100 m travel and high-speed operation of up to 25 m/s (4 m/s at 1 µm resolution).

All Renishaw encoders feature an integral patented set-up LED that speeds installation and removes the need for complex set-up equipment or oscilloscopes. "One of the best features of the Renishaw encoders is how easy they are to set up," added Johnasson. "With the scale attached and the readhead approximately located, the indicator lights make it very easy to see how well the two elements are aligned."

To accurately set the part in the machine's work-coordinate system, the VTG4000 uses a Renishaw RMP60 radio signal transmission touch probe. After a raw part is placed on the bed, the RMP60 is loaded into the tool changer and used to locate the exact position of key features in a matter of seconds. This data is used to update the coordinate system in-cycle for quick, accurate machining.

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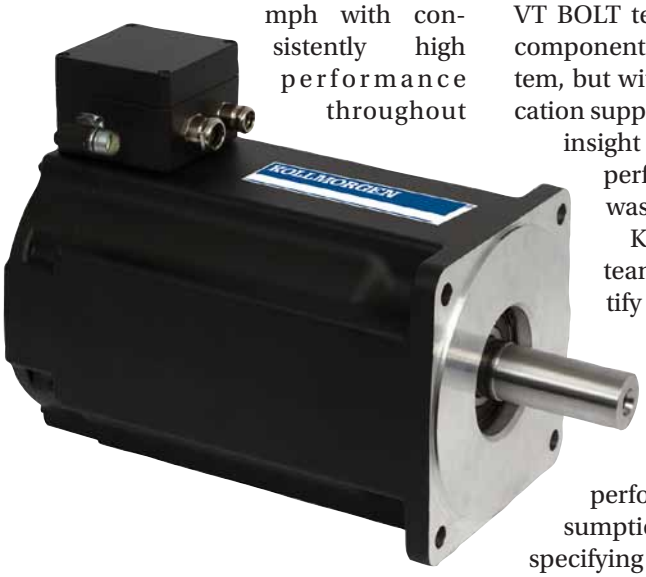
Kollmorgen

DELIVERS COMPONENTS FOR ELECTRIC MOTORCYCLE

VT BOLT, Virginia Tech University's entry to the 2012 all-electric TTXGP is a 100 percent electric racing motorcycle driven by a low-voltage Kollmorgen AKM 74 AC permanent magnet motor and a Kollmorgen ACS80XL 80V Gen6 drive. The results have been impressive, with the AKM motor and ACS drive enabling VT BOLT to achieve top speeds in excess of 100 mph with consistently high performance throughout the duration of each approximately 20-mile race using a 7.5 kilowatt hour battery pack. The VT BOLT was a recent first place winner of all three of its TTX75-cup races including Portland International Raceway, Laguna Seca Raceway and Miller Raceway, solidifying VT BOLT as the 2012 North American TTX75 Cup winner.



Virginia Tech's BOLT was designed to compete in the 75-class (7.5 kWh energy storage) motorcycle division. The idea was to develop a 100 percent electric motorcycle that could perform as fast as possible, while optimizing the energy stored in the battery to achieve maximum performance throughout each race. It also required just the right balance of torque and speed to accommodate the numerous turns common to GP racetracks, but without overconsuming power and compromising performance at the end of each race. Virginia Tech not only had to understand the technology, they needed to integrate the technology into a purpose-built racing machine. The VT BOLT design team turned to Kollmorgen for help and sponsorship.

"Kollmorgen's standard technology platforms are ideal for a wide variety of high-performance applications in that they are easily customized to meet the specific needs of a particular application, and the VT BOLT project was no exception," says Brad Monday, design engineer for vehicle systems, Kollmorgen. "We not only helped the VT BOLT team identify and integrate components into an optimized system, but with our sophisticated application support we were able to provide insight into how VT BOLT would perform on the track before it was built."

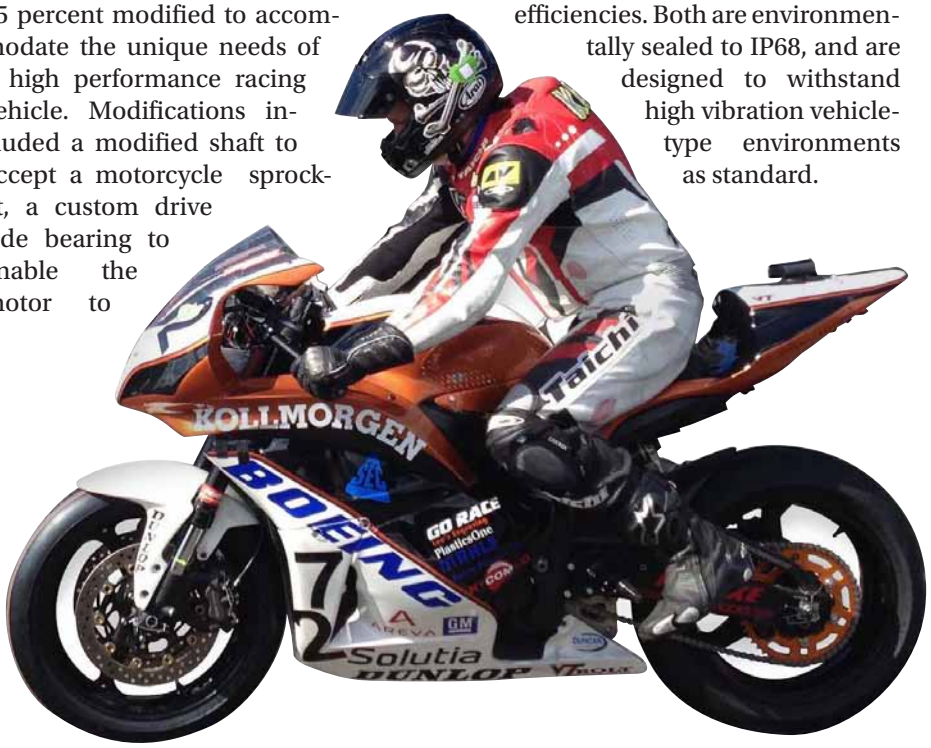
Kollmorgen worked with the team at Virginia Tech to identify the optimum drive/motor/gearing system that would enable VT BOLT to leverage the available power of the battery pack to deliver the best performance in terms of consumption and speed, ultimately specifying a Kollmorgen AKM motor and ACS drive.

According to Monday, the AKM74 motor was 75 percent standard and 25 percent modified to accommodate the unique needs of a high performance racing vehicle. Modifications included a modified shaft to accept a motorcycle sprocket, a custom drive side bearing to enable the motor to withstand the radial loads exerted on the shaft by the chain, and a modified motor winding to operate at the low voltage required by the 7.5 kWh battery pack.

The ACS80 is a 40 kW, or 54 hp, drive as standard. Kollmorgen delimited the drive for the VT BOLT application to enable higher power output (57.6 kW or 77.2 hp) for the shorter duty cycle and duration of the racing environment. Monday says that the Kollmorgen ACS80XL 80V Gen6 drive was a perfect fit for VT BOLT because the capabilities needed to deliver the desired performance were inherent in the drive.

"The particular ACS drive used in the VT BOLT motorcycle is commonly used in 4-5 ton forklift vehicles to control traction. For VT BOLT we simply modified the drive interface to accept this application and programmed it to formulate speed, throttle and power regeneration for braking, while also coordinating the rider interfaces through the drive," explains Monday. "Other drives in the ACS family are often used to control steering wheels and brakes, operate hydraulic pumps and perform overall vehicle control; ACS drives are fundamentally flexible enough to be used in an assortment of applications."

The AKM motor provides mid-ninety percent efficiencies and the ACS drive provides high-ninety percent efficiencies. Both are environmentally sealed to IP68, and are designed to withstand high vibration vehicle-type environments as standard.



The motor and controller convert DC power from the battery pack to AC power for the motor. The motor then takes the AC power and converts it to torque and speed to power the motorcycle's drivetrain. The drivetrain consists of two gears and a chain which are connected to the rear wheel of the motorcycle.

"This project was just a lot of fun from start to finish for everyone involved," says Monday. "It was a great opportunity to work with engineering students and to push the limits and boundaries of products to achieve high performance in a unique application. Additionally we get to share the finished product with Kollmorgen associated back at the plant to see and enjoy firsthand."

For more information:
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203A West Rock Road
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www.kollmorgen.com

Smalley Steel

OFFERS METRIC HOOPSTER RETAINING RINGS

Smalley Steel Ring Company recently announced the launch of the new Metric Hoopster retaining rings. The new Metric Hoopster retaining rings offer an innovative way to retain mechanical components when space is a problem. The Hoopster's minimal radial projection and shallow groove depth allows the Hoopster to fit where regular stamped rings and retaining rings cannot. The Hoopster's low-profile, precision circularity and small radial size allow it to be an unobtrusive component in an assembly. Hoopster retaining rings are suitable for light to heavy loads and are ideal for thin wall tubes. An additional advantage of the Hoopster is its potential for high thrust capacity. The low radial profile will not twist or deform under load as with conventional retaining rings. As an extension to Smalley's popular Hoopster Retaining Rings, the new metric series offers engineers added design flexibility. Over 150 new rings are available from 10 mm to 76 mm in carbon and 302 stainless steel. Hoopster retaining rings are easy to install and remove without any special tools. Specials can be made with no-tooling-charges. Internal housing rings are available with an optional bent end (removal provision) to simplify the process.

For more information:
Smalley Steel Rings
555 Oakwood Road
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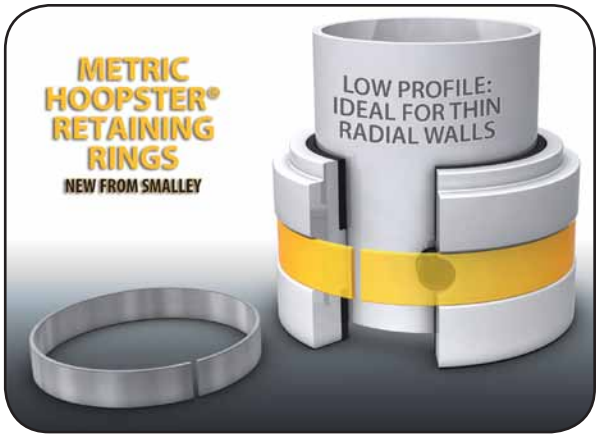
Phone: (847) 719-5900
www.smalley.com



Stober Drives

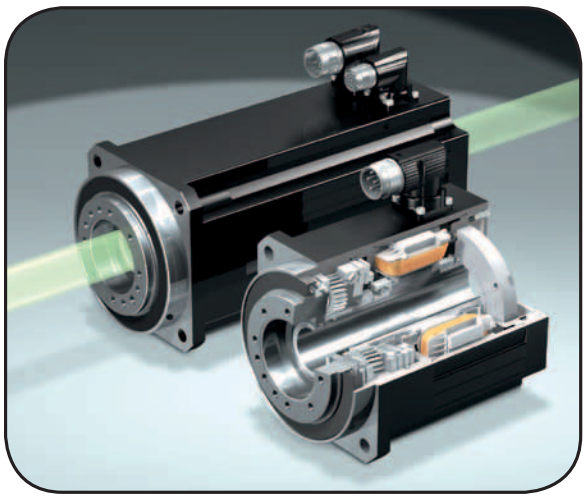
INTRODUCES EZF SERVOMOTOR

Stober Drives, Inc. of Maysville, Kentucky has introduced its EZF/PY hollow-bore pipe drive into its new product line. Only a few manufacturers in the world manufacture a similar product. The hollow bore servomotor ranges from a zero to 3,000 rpm output speed and 4.2 Nm to 350 Nm stall torque. It features an inside diameter ranging from 28 to 42 mm. The EZF is particularly well-suited for the packaging, printing, general automation, robotics and machine tool industries.

"The EZF-PY servomotor conforms to the high standards we set to continue Stober's heritage of delivering gold-standard products and exceptional service," said Peter Feil, vice president at Stober's Maysville, Kentucky plant. "The EZF will help customers substantially reduce their total cost of operations."

The gear motor eliminates the need for a right angle drive when space is critical, adding increased performance and lowering costs, said Adam Mellenkamp, product manager at Stober.

"The configuration has a hollow shaft that allows for power cables, air cables, data lines and laser beams to get through the center of the motor," said Mellenkamp. "You can even use liquid cooling to increase torque capacity of the unit. This is our way of helping manufacturers become cleverer, leaner and utilize fewer parts."



The servomotor comes in frame sizes 5 (115 mm square) and 7 (145 mm square)—and an extremely short length: as small as 134 mm. "Everyone knows of a time when they could have used this gear motor," said Mellenkamp. "This product fills a needed niche in motion control."

The EZF/PY provides industrial implementation of tooth-winding using orthocyclic linear winding technology. This feature makes it possible to manufacture the stator windings with the highest possible copper fill factor. The winding technology increases the motor power output by approximately 80 percent; for this reason it is possible to shorten the length of the motor by almost half without reducing power output.

An advantage of the motor is that it is thermally protected by a positive temperature coefficient (PTC) in each phase of production. PTC in the EZF/PY ensures that electrical resistance increases when outside temperature increases. Once the PTC reaches a certain temperature (145 degrees C.), the monitoring system activates to protect the motor winding from heat damage. A KTY-84 temperature sensor is also available.

The PY also has water or forced-air cooling for a higher-rated power at high ambient temperatures, allowing for a 35 percent torque increase. A fan can be added in the field. Due to its weight-saving design, the pipe drive is particularly suitable for applications in which the motor itself is part of a moving axis.

Rotatable connectors allow for easy connection and cable routing. The motor also features an optional magnetic brake for holding static loads. The brake is engaged when the power is off. The servomotor is designed to run with most popular servo drives. Stober offers support and sizing recommendations to make proper selections.

For more information:
Stober Drives, Inc.
1781 Downing Dr.
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Phone: (800) 711-3588
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Ruland

OFFERS DIVERSE SERVO COUPLING LINE

Ruland Manufacturing Co., Inc. manufactures a diverse line of servo couplings to provide solutions for applications such as stepper and servo systems, linear actuators, ball screws, lead screws, encoders and valve actuation. Industries including medical, printing, packaging, machine tools, linear motion, semiconductor, and solar benefit from having a variety of couplings to choose from. Each application has performance requirements that must be met for the system to function properly. Understanding the different characteristics of each coupling is critical when making a selection. Rigid couplings have high torque capacity, torsional stiffness, and are zero backlash. Ruland straight bore rigid couplings have precision honed bores for proper fit and alignment. Proprietary Nypatch coating is used on hardware to resist vibration and maintain holding power. Two-piece styles feature opposing screws for balancing, reducing vibration at higher speeds. Ruland rigid couplings are available in carbon steel for highest torque capabilities, aluminum for low inertia, and stainless steel for corrosion resistance. Inch, metric, and inch to metric sizes are available with or without keyways from 1/8 in. to 2 in. and 3 mm to 50 mm.

For more information:
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Mitsubishi Electric

UPGRADES INVERTER RANGE

Mitsubishi Electric has upgraded the FR-F700-EC range of inverters with a number of functions that meet the specific needs of water and pumping applications. The new functions supported by the upgrade include a pre-charge function, built-in PLC functionality, expandable I/O and a unit calculator for PID control. These enhancements increase the capability, flexibility and scope of the FR-F700-EC, bringing improved control and reducing the cost and complexity of drive installations in many applications by eliminating the need for additional components.

A key issue within many pumping applications is water hammer – the pressure surge that can occur when the flow of water starts or stops suddenly. Aside from the noise of water hammer, the vibration can quickly compromise system life and ultimately lead to break down of pipeline systems. The new pre-charge function eliminates the problem of water hammer and extends system life by gradually filling the pipeline. Flexible adjustment options enable the end of the pre-charge cycle to be controlled by feedback level, terminal input or set time. The FR-F700-EC now also includes built-in PLC functionality, suiting the drive to standalone use in pumping and water applications and eliminating the need for a separate PLC for sequence control operations. The built-in PLC offers a program capacity of 4,000 steps, and the PLC function supports 32-bit instructions to handle 32-bit data. The inclusion of two option ports on the drive enables the I/O to be expanded with analogue and digital inputs and outputs, as well as relay outputs. This

enhanced I/O can be used to provide feedback inputs for the PLC and control outputs to valves and other components. For enhanced security in the field, the program can be password protected.

The new control keypad supports the ability to display PID values in engineering units allowing for easier set up and monitoring. This is especially useful in pump and fan installations. There are actually 32 different unit settings available, for example, Pascal (Pa), liters per minute (L/M), cubic meters per minute (CM/M) or bar.

With these new functions Mitsubishi Electric has already addressed a number of applications within the pumping and water industry, for example an irrigation system where there were several pipelines of different heights and lengths, but only a single pump and pressure sensor. The built-in PLC function enabled six different PID set points to be stored, and then simply selected by a switch on the cabinet door, providing a simple solution in an application that might once have required substantial inverter and PLC knowhow.

For more information:
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www.mitusbishielectric-usa.com

Automation Direct

RELEASES SURESTEP DUAL-SHAFT MOTORS

AutomationDirect has expanded the line of SureStep motion control products. Stepping motors in standard NEMA sizes (17, 23 & 34) now include dual-shaft, bi-polar models with output torques ranging from 61 oz-in. to 1288 oz-in. The motors feature front and rear shafts to allow installation of an encoder, hand crank or a second load

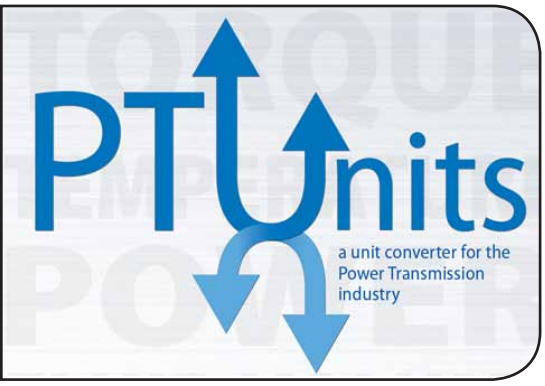
onto a motor; a pigtail cable with locking connector allows for easy hook-up. The motors travel 1.8 degrees per step, providing 200 steps per revolution. Backed with a one-year warranty, the stepping motors are CE- and RoHS-compliant and prices start at $22. The SureStep motors can be controlled by SureStep microstepping drives, programmed with *SureStep Pro* software.

For more information:
AutomationDirect
3505 Hutchinson Road
Cumming, GA 30040
Phone: (770) 889-2858
www.automationdirect.com

Sumitomo

INTRODUCES MOBILE APPLICATION

Sumitomo Machinery Corporation of America (SMA), U.S. headquarters for Sumitomo Drive Technologies, introduces PT Units, a new Power Transmission Industry mobile application for the iPhone, iPad and iPod Touch. PT Units offers three main functions: converting units, contacting Sumitomo Drive Technologies representatives



and connecting to Sumitomo's web resources. The unit converter quickly and accurately converts between commonly used units of power, torque, force, temperature, fluid volume, mass and length. Additional options available in this function include copying the resulting conversion text and pasting it into other applications, and setting the default units upon launching PT Units. The contact function enables users to locate a Sumitomo Drive Technologies' sales representative by navigating to find their location, or using their device's built in Current Location feature to obtain the representative's contact information. With a data network connection, this information is available for USA, Canada, Mexico, Central America, Caribbean Islands, South America and Japan. This function also enables iPhone users to contact a Customer Service representative via phone or email, and iPod Touch and iPad users via E-mail. The website function allows users with a data network connection to navigate through Sumitomo Drive Technologies' website for product information, industry-specific information, and white papers. They may also use the provided links to visit the company's Facebook, Twitter and YouTube pages. Designed to assist the power transmission and controls industry, PT Units is available in English, Spanish, Portuguese, French and Japanese.

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Steinmeyer, Inc.

RELEASES HIGH PRECISION MICRO STAGE

Steinmeyer, Inc. announced a new high precision micro stage, the MT 196LM series. Available in two travel options, of either 100 mm or 200 mm, the MT196-100-2LM and the MT196-200-2LM is suitable for applications in the semiconductor metrology, biomedical, miniature robotics and laser industry. The MT196LM has a footprint of 110 mm × 196 mm, height of 45 mm and, depending on which stage you choose, weighs 4.1 or 4.7 kgs. Manufactured from high strength anodized aluminum, this series of table offers a positional accuracy of 2 µm (micrometer), straightness/flatness runout of ± 5 µm for 100 mm of travel and ± 10 µm for 200 mm of travel with repeatability of ± 0.2 µm. Features include: preloaded cross roller bearings, fixed stops, incremental linear encoder with 0.1 µm resolution and a linear piezo motor drive. This product can be provided as a XY stage without any adapter plate. Ultra high vacuum, clean room or non-magnetic preparation is available on request.

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