

# Gearing Solutions

HARNESSES RELIABLE ENERGY FOR QED WIND POWER

As the wind comes sweeping down the plains of America these days, it passes through fields of wind turbines. As the energy market turns towards renewable sources of energy, many are turning to wind as an efficient and sustainable source of power. The industry is restricted, however, by the Betz limit, a theory that wind turbines can at most harness 59 percent of the kinetic energy of passing breezes (at 100 percent efficiency, there would be no wind to turn the blades). Then there's the weather factor: even the most streamlined nacelle with perfectly balanced blades is only as reliable as the wind, fickle and changing day to day. In order to maximize electrical production and approach that 59 percent efficiency, wind turbines depend on yaw drives to point the blades in the direction of wind.

QED Wind Power manufactures the Phoenix 20 kW wind turbine systems suitable for farms, residences and small commercial applications. They pride themselves on reliability—if the wind is blowing, the turbines are turning—an ideal they live up to through innovative design and quality American-made parts. Yaw Drives from Gearing Solutions help ensure the turbines are facing the wind, maximizing efficiency and ensuring reliability.

According to Steve Saal, chief operating officer, when QED was looking into manufacturing the Phoenix 20 kW turbine, the competition on the market was all manufactured in China. The team wanted parts made in America, to ensure quality control and better access to repair parts. QED got their wish, and the Phoenix is a veritable tour of American manufacturing: the blades come from Texas, the meteorological sensors from Oregon, and the Yaw Drive from Gearing Solutions in Solon, Ohio.

When researching Yaw Drive suppliers, Saal and his team talked with several suppliers who wanted to sell them what they had on the shelf, missing the details of their specific needs. The engineering staff at Gearing Solutions talked with QED several times before

producing their first prototype.

Gearing Solution engineers helped design the drive shaft to be hardier and more robust, increasing the shaft size and upping the three-phase motor to 1.5 hp. Gearing Solutions also designed the Yaw Drive with grease discs rather than gear oil, to make maintenance easier. After several months of testing and revisions in shaft size and material, the new Yaw Drive was ready.

Gearing Solution's Yaw Drives combine unique roller gear technology with innovative gear construction to optimize the gearbox and minimize size. Gearing Solution's gearboxes are 50 percent shorter than standard and can manage 30 hp and higher, redirecting the turbine alignment so the blades face the wind and produce the maximum amount of energy at all times.

With the addition of an internal roller gear, driver and multiple planets, Gearing Solutions increased load capacities up to 300 percent, an unparalleled power to weight ratio. Aluminum housings make the drive 50 percent lighter, creating a premium weight to torque ratio inside a small profile. The small profile allows the nacelle of the turbine to be as lightweight and aerodynamic as possible. The lighter weight also allows the Yaw Drive to be easily installed and repaired, despite working at height in a

restricted space environment.

Despite their lighter weight, Gearing Solutions Yaw Drives are built to provide years of trouble-free service. The QED tower systems lower the complete tower to ground level for ease of access and increased safety while performing maintenance. Still, lowering the tower causes downtime for repairs.

The Gearing Solutions Yaw Drives' durability reduces downtime, ensuring the turbines are constantly generating energy. Many Gearing Solutions Yaw Drives have been in continued service for more than five years without ever causing downtime in a production turbine.

"We take it for granted," Saal said, "It's like a door in your house that you don't think much about until it falls off the hinges. And this one hasn't fallen off the hinges."

With the reliably durable Gearing Solutions Yaw Drive, QED Wind Power can be sure that their wind turbines are harnessing the maximum amount of wind available. Gearing Solutions' power-to-weight ratio helps ensure the turbines keep the power on for years to come—no matter which way the wind blows.

**For more information:**

Gearing Solutions  
Phone: (440) 498-9538  
[www.gearingsolutions.com](http://www.gearingsolutions.com)



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# SKF Actuators

OFFER MODULAR DESIGN FOR SPEED, LOAD CAPACITY AND ACCURACY

SKF CASM-100 electromechanical actuators from SKF Motion Technologies, Inc. have been uniquely engineered with a modular design enabling tailored solutions for a wide range of industrial linear movement and positioning applications. Various modules providing choices among motor types, gearboxes, ball screws or roller screws, and accessories allow for custom combinations of components ideally suited for an application. Standardized interfaces connect the different components to each other for ideal operation of actuators in service.

These actuators deliver optimized performance in speed, load capacity, and positioning accuracy, perform virtually maintenance free and, compared with hydraulic or pneumatic systems, serve as more environmentally friendly and energy-efficient solutions. In addition, they use up to 80% less energy than pneumatic cylinders and 50% less energy than hydraulic alternatives and eliminate any need for constantly running compressors, hoses, and other components.

Applications include robotic cells, handling and packaging machines, sorting systems, manufacturing, and cutting and assembly machines, among many others across industries where reliable, accurate, and precise repetitive motion is required.

Featuring a linear design that can withstand even the harshest operating conditions, CASM-100 actuators are manufactured from high-grade mate-



rials, boast a long service life, and offer superior precision and repeatability. They can deliver a force range up to 82kN / 18,400 lbf. linear speeds up to 890 mm/s, long stroke lengths (up to 2 m / 6.5 ft.), and will support Industry 4.0 technology objectives.

CASM-100 actuators can fit standard industry footprints and can easily facilitate system retrofits or conversions to meet any space and performance requirements. Flexible mounting options and a variety of accessories are available. The actuators are fully equipped to achieve optimal service life, even at very high forces, and ultimately can deliver a highly favorable cost/performance ratio.

**For more information:**  
 SKF Motion Technologies  
 Phone: (267) 436-6768  
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# S.S. White Technologies

PROVIDES CUSTOM FLEXIBLE SHAFTS FOR AEROSPACE APPLICATIONS

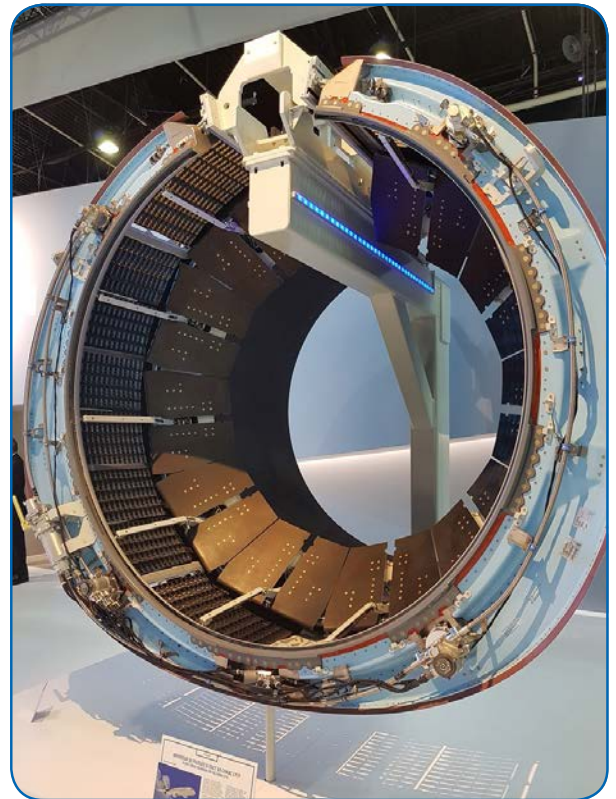
S.S. White Technologies highlights bespoke flexible shaft solutions for aerospace applications. Flexible shafts transmit rotary motion much like a solid shaft, but can be routed over, under and around obstacles where a solid shaft cannot be used. Flexible shafts are used in a variety of applications, including many capacities in aerospace, such as in thrust reverser actuation systems (TRAS), flap and slat systems, variable bleed valves, jet afterburner nozzle control systems, cargo door actuation systems, valve override and many more. S.S. White provides customers with custom flexible shaft solutions designed for specific applications, all backed by S.S. White's wealth of experience and expertise.

While used in many systems on various aircrafts one significant aerospace application is to manually actuate valves if the automatic system in place were to fail. Any number of valves may be manually actuated using a flexible shaft assembly, including Air Turbine Starter (ATS) and anti-ice valves, as well as those applications mentioned in the paragraph above. The ability to control the valves manually in the event of the automated system's failure means the aircraft can still be safely "dispatched" on time, avoiding the time and costs associated with having to find a substitute aircraft.

In addition to the ability of flexible shafts to enable manual overrides of aircraft systems that are usually automated, they are also the preferred rotary motion technology in aerospace applications for a number of other reasons including absorbing shock, dampening vibration and eliminating alignment problems.

S.S. White Technologies produced its first flexible shaft in 1874 for a high-speed dental engine used for drilling teeth. Today, their flexible shafts for aerospace applications are used in thrust reverser, flap, slat actuation systems and manual overdrive systems of air and space craft, in the ammunition magazine drive of the AC-130, in many Airbus & Boeing thrust reverser systems, in the Hubble Space Telescope, on the international space station (ISS) and as part of the V-22 Osprey's rescue hoist system.

S.S. White provides flexible shaft assemblies as part of a custom solu-



tion. Every application in which a flexible shaft is used is different, and S.S. White not only manufactures the flexible shafts, but also provides the technical expertise to create solutions to engineering challenges.

### For more information:

S.S. White Technologies  
Phone: (732) 474-1700  
[www.sswwhite.net](http://www.sswwhite.net)



# Amacoil

LINEAR MOTION DRIVE PROVIDES FLEXIBILITY AND PRECISION

The Precision Motion Drive System from Amacoil/Uhing is an Uhing Model RG rolling ring linear drive integrated with a motion controller for precision linear motion applications. The Precision Motion Drive is fully programmable and meets application requirements for precision winding/spooling, pick-and-place machines, X-Y coordinate tool movement, metrology equipment and other machinery providing fast, accurate positioning and reciprocating linear motion. Depending on the size of the RG drive nut in the system, the Precision Motion Drive System provides from 7 to 800 pounds of axial thrust.

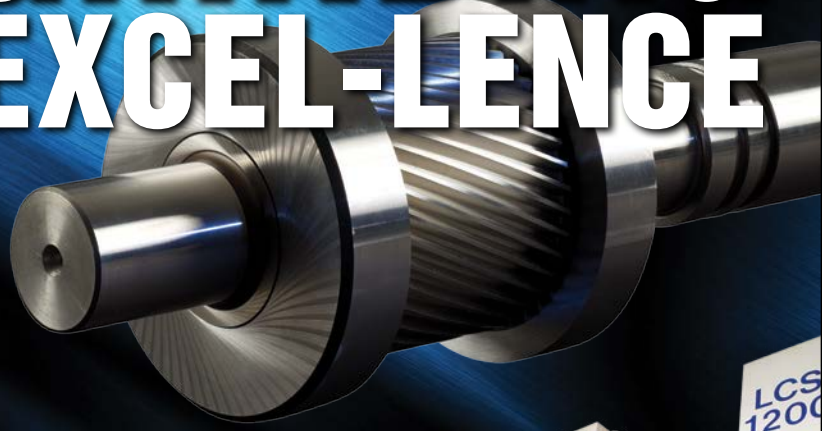
The linear movement of the drive head is controlled via software and monitored by sensors feeding back to an electronic control unit. The Precision Motion Drive stores up to 20 programs that may be recalled at the touch of a button. While meeting application requirements for most precision linear movement applications, the system is especially well suited for precision winding of a wide range of round or flat materials including wire/cable, PVC tubing, string, fiber, rope, rubber hose and vinyl strips. The Precision Motion Drive system also handles custom winding patterns and irregularly shaped spools.

The Precision Motion Drive System offers flexibility with regard to customized linear movement of the drive nut. Stop/start, travel direction, linear pitch, travel speed, repetitive processes, ramp up/down and essentially all other variables pertaining to drive nut movement may be programmed into the system to meet precision linear motion application requirements. The core PLC/software package may be used to control multiple Uhing Model RG drive stations making it unnecessary to invest in multiple systems in order to help sustain high production rates.

A stepper motor controlled by a Siemens S7 PLC is included in the package. Fast, simple operation is enhanced with intuitive prompts displayed on a touch screen control panel. The shaft on which the Precision Motion Drive runs is smooth case hardened steel. There are no threads which makes the system useful in applications where



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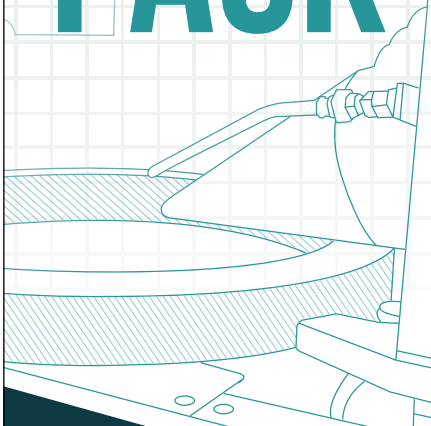


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particulate contaminants could fall into threads causing jams or clogs. The shaft rotates in one direction only making it unnecessary to purchase a reversible motor. Drive nut travel direction, linear pitch and other motion parameters are controlled by the angle

of the rolling ring bearings inside the drive unit which in turn is controlled by user programming.

**For more information:**

Amacoil (Uhing)  
Phone: (610) 485-8300  
[www.amacoil.com](http://www.amacoil.com)

## GAM

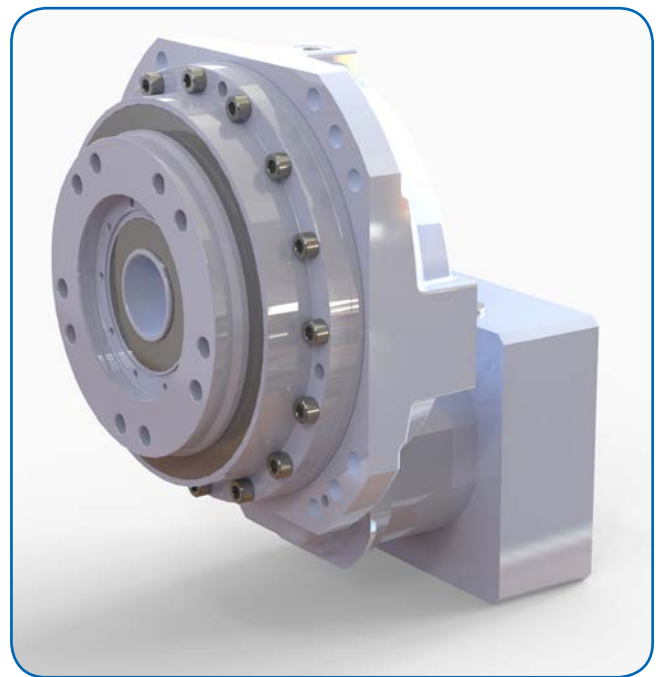
RELEASES ZERO-BACKLASH ROBOTIC GEARBOXES

GAM announces the release of the new GPL zero-backlash planetary gearboxes. The new gearboxes provide high precision and rigidity for horizontal and vertical robotic and motion control applications.

Featuring a patent-pending design, the backlash will not increase over the lifetime of the gearbox, maintaining high precision and eliminating periodic adjustment. The GPL series is available in seven sizes with ratios from 36:1 to 200:1.

“The GPL expands GAM’s offering into zero-backlash gearboxes,” said Randy Kuper, regional sales manager at GAM, “and with less than 6 arcsecs [0.1 arcmin] backlash, the GPL has the highest accuracy on the market.”

Output options for the GPL series include a solid flanged output (GPL-F) and a hollow shaft flanged output (GPL-H). The GPL series can be used in a variety of applications, from robotics and automation to medical equipment, where zero-backlash, high tilting and torsional rigidity and long life are required.



**For more information:**

GAM  
Phone: (888) 426-7117  
[www.gamweb.com](http://www.gamweb.com)

# Nexen

EXPANDS PRECISION ROTARY INDEX LINE

Nexen Group, Inc. introduces the Motor Ready Sealed (MRS) precision rotary indexer. The MRS maintains the benefits of the company's existing patented precision roller pinion drive design - zero backlash, high precision, high torque, and high acceleration - while delivering significant new benefits. A high roller pinion-to-gear ratio allows users to direct drive the system with the addition of a servo motor - eliminating the cost of a reducer. This also reduces engineering and installation time. For high load applications, the customer can drive the system with a reducer/motor combination. Additionally, the gear-to-pinion reaction loads are fully supported so the servo motor shaft is not subjected to radial loading, which eliminates the need for costly high output capacity reducers in high load applications. All of these features reduce engineering and installation time. The MRS is ideal for precision rotary indexing applications such as machine tool, and semiconductors, robotics, automated welding, medical packaging, assembly, cutting systems.

## For more information:

Nexen Group, Inc.  
Phone: (800) 843-7445  
[www.nexengroup.com](http://www.nexengroup.com)



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# Quicksilver

EXTENDS HYBRID SERVO MOTOR FAMILY

QuickSilver Controls has released the X-series 34 Frame SilverMax Integrated Servo Motor Family. This extends the company's hybrid servo product line.

QCI-X34 series operate from 12.5 v to 72 v (processor section 12 v to 48 v). Mechanical power out levels up to 850 W. X34CK-1 and -2, and X34CT-1 have been added as a lower cost option for the mid power range. The X34HC-x family covers the upper power and torque range. These hybrid servos use advanced techniques to obtain a high efficiency of up to 80 percent over up to a 4:1 speed range (greater than 70 percent over a 10:1 speed range) This is including both the motor and the driver. This is the result of a combination of a very high torque constant motor with a very low winding resistance, and the application of field-weakening techniques. The high torque constant allows this motor to produce full continuous power by 500 rpm for the 48 v drive level, and to continue this same power level through 2,000 rpm.

These hybrid servo motors are designed with an interior permanent magnet rotor, (also called buried magnet), allowing for field weakening. This lets us extend the high efficiency operation over a wide range by effectively turning down the torque constant to enable higher speed operation at a given voltage—keeping the motor back-EMF near the input voltage over a wide range of speeds. In contrast, conventional servo motors use low permeability face mounted magnets in their rotors which make it much more difficult to use field weakening techniques, thus their region of high efficiency operation is limited to very near their optimal speed where back-EMF nears the input voltage. Operate conventional servos at 20 percent of their optimal speed, and they will have 20 percent of their optimal efficiency at best. Operate conventional servo motors them at peak torque and their heating rapidly increases - to the point that they can only sustain for typically a few seconds - and their efficiency



plummets. (Both motors compared at 48 VDC; peak torque for conventional motor equaled the continuous torque rating of the X34HC-1 system.)

This means if you are using most conventional servo motors to direct drive a belt or lead screw applications, then it is likely the motor will not be near their power rating, and the efficiency will be poor. Peak torque for conventional servos will typically be available for only a brief 1 to 5 seconds before the windings are nearing maximum temperature. This is not surprising as conventional servo motors get their peak torque by overdriving the motor by a factor of 3x to 10x the sustainable current - which causes 9x to 100x the resistive heating as compared to their continuous current rating. The hybrid servo, alternatively, produces high torques in direct drive operations while running at their nominal continuous currents.

**For more information:**

Quicksilver Controls, Inc.  
Phone: (909) 599-6291  
[www.quicksilvercontrols.com](http://www.quicksilvercontrols.com)

# Ruland

OFFERS LEFT HAND THREADED SHAFT COLLARS

Ruland has expanded its offering of threaded shaft collars by adding inch and metric left hand threaded styles to give designers more flexibility to work with standard off the shelf components. They are available in one- and two-piece clamp styles in steel and stainless steel with bore sizes ranging from 1/8 inch to 2 1/4 inches and 4 mm to 30 mm.

Left hand threaded shafting is commonly used to reduce the risk of components coming loose in rotating applications and as a safety measure to prevent the unintended removal of critical components. Ruland manufactures left hand threaded shaft collars in one- and two-piece styles to meet the needs of equipment manufactures. Threaded shaft collars are designed to provide higher axial holding power than round bore collars of comparable size. They are well suited for guiding, spacing, stopping, mounting, and component alignment in industries such as packaging, printing, semiconductor and solar. Two-piece type allows for simple installation or disassembly without the need to remove adjacent components.

Ruland double taps threads to ensure a precise and burr-free finish allowing for easy installation and removal, proper fit, and extended shaft life. Equipment manufacturers benefit from the tightly controlled face to bore perpendicularity of Ruland shaft collars ( $TIR \leq 0.002$  inch or 0.05 mm) which is critical when they are used as a load bearing face or for aligning components such as bearings or gears. Forged screws test beyond industry standards to ensure maximum holding power.

## For more information:

Ruland Manufacturing Co., Inc.

Phone: (508)

[www.ruland.com](http://www.ruland.com)



# Motor Design Ltd.

EXPANDS E-MAG MODELING COVERAGE

Motor Design Ltd (MDL) (located in Wrexham, U.K.) has significantly expanded its Motor-CAD version 11 E-Mag (Electro-Magnetic) motor design simulation program by adding a Switched Reluctance Machine (SRM) E-Mag module to its current BPM (Brushless Permanent Magnet) & Synchronous AC Motor (SYNC) & Induction (IM) E-Mag modules of Motor-CAD v.11 simulation program.

The SRM E-Mag module enables the design & analysis of electronically commutated reluctance motors & generators using motor sizing and performance characteristics generated by Motor-CAD. The magnet less SRM motor possesses a superior environment performance with respect to higher thermos & shock conditions.

The FEA electromagnetic solver and a parameterized controller model, output data such as current, power and torque wave forms are produced quickly and easily, allowing fast design optimization processes.

## For more information:

Motor Design Ltd.

Phone: +44 (0) 1691 623305

[www.motor-design.com](http://www.motor-design.com)

