INSIDE STORY

DieQua's GearSync servo drives represent the pinnacle of innovation in motion control technology. Engineered with advanced precision and unparalleled reliability, these servo drives deliver exceptional performance for even the most demanding applications. They are expertly designed to meet the needs of industries such as robotics, packaging, automation, and manufacturing – where seamless and accurate motion control is a must. With GearSync, you gain not only cutting-edge technology but also a trusted solution that ensures consistent, high-quality results every time. In this interview, Tom Kahn, Director, Business Development at DieQua discusses the key benefits of GearSync servo drives.

Motion Design: What are the key advantages of GearSync for servo-driven motion control applications?



Tom Kahn: DieQua GearSync drives are precision-engineered for servo-driven systems, offering reduced backlash, high torque density, and reliable power transmission for improved efficiency and energy savings. Built with durable materials, they ensure longevity and low maintenance in demanding industrial environments. With customizable gear ratios and configurations, they provide flexibility for

diverse applications. Their optimized design reduces inertia, enabling quick response times, smooth operation, and minimal noise and vibration. Tailor-made solutions are available to meet specific needs, making GearSync drives an ideal choice for high-performance, precise and reliable motion control in modern industries.

Motion Design: How does GearSync's coupling system improve performance and address common challenges in servo motor applications?

Kahn: GearSync's coupling system is designed to optimize servo motor performance by addressing common challenges like misalignment, vibration, and wear. It ensures precise shaft alignment to reduce energy loss and equipment degradation, while vibration-damping materials provide smoother operation and extend component lifespan. Built to handle high torque demands, the system offers secure power transfer and resists wear from frequent starts, stops, and direction changes, reducing maintenance needs. It minimizes backlash for accurate positioning in applications like robotics and packaging machines. With user-friendly installation, easy maintenance, and versatility across industries, GearSync's system enhances efficiency, reliability, and cost-effectiveness in servo motor applications.

Motion Design: Why should companies choose DieQua Corporation and their GearSync products for their servo motion control needs?

Kahn: DieQua Corporation's GearSync products are designed for precision and reliability in servo motion control, making them ideal for industries like robotics, automation, and manufacturing. These products ensure smooth, accurate positioning, optimal speed control, and customizable configurations to meet unique business needs. Built with durable materials and advanced engineering, GearSync gearboxes handle hightorque, high-speed applications while reducing energy loss and operational costs. Compact designs make them suitable for space-limited systems, and their energy-efficient performance supports sustainability goals. DieQua offers comprehensive customer support, fast lead times, and decades of expertise, earning a global reputation for quality and innovation. GearSync is a trusted solution for high-performance motion control.

Motion Design: How do GearSync drives enhance efficiency, reliability, and durability in high-speed servo environments

Kahn: GearSync is a high-performance series of high torque gear reducers specifically tailored to utilize the latest features in servo motion systems, offering enhanced efficiency, improved reliability, lower inertial demands, and long-term durability and uptime performance. Its optimized functionality ensures high speed performance and synchronization in motion control applications, by utilizing lightweight materials for demanding applications. GearSync's designs deliver reduced energy consumption, minimizes downtime, and maximizes ROI, making it ideal for industries requiring efficient, reliable, and long-lasting high-speed servo systems.

Motion Design: What are some applications that benefit the most from GearSync servo drives?

Kahn: GearSync is a technology that enhances the performance of robotic and automated systems by ensuring precise synchronization and smooth, coordinated motion. It is crucial for applications like pick-and-place robots, industrial arms, and servo-driven conveyors, where exact timing improves accuracy, reduces waste, and prevents bottlenecks. GearSync also ensures precision in machines like printers, slitters, and labelers, improving alignment and reducing errors at high speeds. For packaging machines, laser cutters, and plasma cutters, it minimizes motion deviations, achieving flawless finishes. In packaging equipment, GearSync maintains synchronization under varying loads, boosting efficiency, throughput, and reliability.

For more information, visit: https://www.diequa.com/ products/speed-reducers/.



DieQua's New Gearsync Helical Gearbox Series Debuts in Detroit

Servo Gearmotors

Servo motors, which are used for precise control of angular or linear position, speed, and acceleration, are commonly found in applications such as industrial automation, conveyor systems, and robotics. They provide a mechanical advantage in automation applications by multiplying motor torque while simultaneously reducing the driven load's reflected inertia back to the motor. To maximize efficiency, zerobacklash couplings designed for input connections and equipped with precision overload protection components provide rotary motion control, enhancing the reliability and efficiency of industrial machinery.

As a leading designer and manufacturer of high-quality motion control and power transmission solutions, DieQua's new Gearsync Helical Gearbox Series delivers exceptional precision, reliability, and versatility over a

wide range of demanding industrial applications. Engineered for optimal torque transmission, speed reduction, and motion accuracy, Gearsync servo gear units offer high-performance solutions for industries such as packaging, material handling, and conveying systems, which require precise and efficient gear technology.

Performance Advantages

A major advantage of the Gearsync servo gear unit is its high efficiency, reduced backlash, and high torsional stiffness, ensuring precise positioning, misalignment compensation, and stability in dynamic applications such as robotics, automation, and packaging machining.

Key features include seamless integration input and flexible coupling design advantages.

Gear backlash — the clearance or play, between the mating gear teeth, when the servo reverses direction — can sometimes be a hindrance. This loss of motion can create instability, especially in applications that require precise positioning. Backlash can also lead to variances in controller performance that cause instability and reduce accuracy and efficiency.

The optimized gear ratio and enhanced torque density allow for high-speed operation while maintaining superior control, reducing maintenance demands, and improving overall system efficiency.



Gearsync comes equipped with a universal coupling system — a feature that is uncommon in the automation industry, thereby providing DieQua with an immediate advantage over its competitors. The coupling system adds value to the Gearsync line by enabling seamless integration with IEC, NEMA, AC, DC, BLDC, and SERVO motors.

Featuring a robust half-coupling with an elastic synthetic element, DieQua's innovative design eliminates the need for keyways on the motor shaft. This not only simplifies installation, but also enhances performance by reducing wear and ensuring a secure, backlash-free connection. However, inertia matching must be conducted between the servo motor and the gearbox.

Inertia matching, crucial in motion system design, refers to balancing the inertia of a motor and its load to achieve optimal performance, stability, and responsiveness, especially in servo motor applications.

The inertia of the motor and the inertia of the load (the object being moved) interact. The moment of inertia ratio is the load's moment of inertia divided by the motor's moment of inertia. Inertia mismatch, which refers to the difference in physical inertia between the motor and the load, can lead to problems such as slow response times, reduced bandwidth, and increased motor stress.



Performance of the motor improves as the inertia ratio decreases. If precise motion is required, the lower the moment of inertia ratio, the more precise/efficient the motor's movement will be. Reducing the inertia of the load is usually the best way to improve performance, without increasing motor size.

The universal coupling system is ideal for intermittent applications involving on/off or forward/backward cycles, with the flexible coupling dampening vibrations in these movements. Additionally, the system supports long-life lubrications and reduces noise through precise gear train meshing.

Other performance advantages of the coupling system are:

- · Greater flexibility in gearbox-motor connections
- · Elimination of contact oxidation for increased durability
- No fretting corrosion between motor sleeve and electric motor shaft
- Improved efficiency
- Cost-effective design with direct compatibility to known brand dimensions
- Increased torsional rigidity
- Reduced vibrations
- Extends the lifespan of lubricating elements such as sealing rings
- Easy disassembly of the motor after long periods of use

A coupling system also cushions motor start-up jerks. If there is no soft start with an electronic control, turning on the motor can jerk the gearbox rotations; an elastomer coupling between the motor and the gearbox input can soften the initial turning on of the motor.

Gearsync Takes Automation to a Higher Level

The new Gearsync line also reduces gearbox operating temperatures in the motor connection area. This is achieved by inserting a coupling between the motor and the gearbox, which transfers less heat to the gearbox (traditional inputs are metal on metal, which maximizes heat conductivity and reduces operational lifespan).



DieQua Corporation's extensive knowledge of gear technology, in-house repair services (especially emergency breakdowns for quick turnaround), and ability to create custom solutions for optimal performance, further enhance the value of the Gearsync product line. As an ISO 9001-certified company, DieQua ensures that all products meet the highest quality and performance standards, providing customers with a single-source supplier for gearboxes, couplings, and gear motors.







With these innovations, Gearsync provides high-performance, cost-competitive, and durable solutions for industries requiring superior motion control and power transmission technology.

Customized Parts and Solutions

DieQua's deep knowledge of servo applications across multiple industries makes it an ideal partner for working with manufacturers to develop unique solutions and customized products — especially for projects that cannot be built with off-the-shelf parts.

With their decades of combined know-how and thousands of successful client projects, DieQua engineers are creative problemsolvers who love a challenge. We rely on creative design to find solutions for the most challenging demands. Our input is the most valuable in the earliest stages of design, where DieQua product engineers work closely with the client's design team to analyze the entire automation project.

Creativity in mechanical design is the catalyst for pioneering automation solutions. By infusing innovative concepts into the design process, engineers can fashion proprietary automation systems that are not only efficient but also adaptable to diverse operational requirements. This fosters the development of cuttingedge solutions that optimize processes, minimize downtime, and enhance overall productivity.

DieQua engineers take an innovative approach that includes creative application of engineering principles and combine gearing technologies, design thinking, and problem-solving techniques to develop and enhance automated systems, machinery, and robotics. By combining creativity with technical expertise, we can drive continuous improvement in automation machine design, including streamlined and adaptable automation systems that are flexible, efficient, and highly productive.

Innovative thinking plays a pivotal role in enhancing the cost and efficiency of production processes in automation. This leads to the creation of more efficient machinery, reducing production costs through improved energy efficiency and optimized material usage. Moreover, inventive problem-solving fosters the development of automation solutions that are tailored to specific operational needs, resulting in enhanced precision and reduced cycle times.

Examples of Automation Innovation

Example 1: An integrator partner asked DieQua to automate a manufacturing process. The existing equipment was driven with AC











motors and cams in a punch-press process to produce products for the home goods market. The existing equipment was not adjustable and the customer wanted the flexibility to use different materials for different purposes, all produced on the same equipment. The challenge was to create a gearbox robust enough to withstand spike loads associated with a punch-press process. The solution was a large servo motor connected to a large helical bevel gearbox that was modified to accept a servo input; many internal components were also adjusted to withstand the repeated shock loading used in this manufacturing process.

Example 2: A manufacturer of a unique furniture system that was suspended in the ceiling of apartments and condos in urban environments asked DieQua to reduce the noise level of this system. The bed, night stands, and clothes storage units would descend from the ceiling when commanded to do so. The problem with the gearbox and motor doing the lifting and lowering was noise — both the volume and "quality" of the noise. The existing system was using inexpensive spur gears driven by a small AC motor; the DieQua solution involved using helical planetary gearboxes driven with a small servo motor. We also coated the assembly with a noise-suppression material. The result was an ultra-quiet drive mechanism.

See Us In Detroit

Founded in 1980, DieQua Corporation has expanded from a single product line to become a leading manufacturer and supplier of an extensive line of high-quality power transmission and precision motion control products, including gearboxes, servo





gearheads, speed reducers, and connecting components. The company also offers custom product modifications and complete design solutions for virtually any servo application.

DieQua's new Gearsync product line will be presented to the public for the first time at Booth 615 at Automate, an automation expo in Detroit May 12-15, 2025.

Designing and manufacturing efficient, customized industrial gearbox designs is one of DieQua's specialties. With our variety of standard components and machining capabilities, providing custom-designed and manufactured gearboxes for distinct applications is a core part of our business.

Options that can be customized include equipment for special environmental conditions, washdown applications, high-speed applications, special shaft designs, advanced materials, unique mounting requirements, multiple shaft outputs, special ratios, and special lubrications.

Tom Kahn, Director, Business Development, Motion Products. Hitesh Patel, Product Manager, Mechanical Engineer, DieQua. For more information, visit www.diequa.com/products.