



White Paper

2G Motion System

Best by Design

KOLLMORGEN



Best by Design

When you need optimal motion control, the intuitive solution is to choose best-in-class components, regardless of vendor mix. But as an engineer, you know that intuitive doesn't always mean right.

The optimal concept assumes that combining the best possible component for each motion function will yield a cohesive system that delivers superior machine performance. Alternatively, many single-source suppliers offer a prepackaged selection of components that have been force-fit together, providing convenience at the sacrifice of optimal system performance.

We believe that both the multi-vendor and the prepackaged single-source approach have too often failed to deliver the best possible motion performance—the level of performance that can create a differentiating advantage in the increasingly competitive world of machine engineering.

Instead, for new or upgraded machines that require breakthrough performance, we recommend a third approach based on a new-generation concept—a single-source solution with a systems-based design.

Incompatibilities you can't see lead to machine performance problems you can't avoid.



To achieve optimal system performance, engineers must consider critical design elements such as drive switching frequency, motor magnetics, feedback frequency, commutation algorithms, and other motion system specifications. All of these details must work together in perfect synergy in order to achieve the highest possible performance levels.

Motion systems often suffer from micro-incompatibilities that reduce overall machine effectiveness and efficiency. Although many motion suppliers are perfectly happy to recommend complete systems, few have evaluated the actual compatibility or synergistic performance of their motors, drives, and other motion components when packaged together as a system. So it's only natural that machine designers often turn to a multi-vendor, optimal approach to create their own motion systems.

However, these optimal systems also deliver suboptimal performance due to the same micro-incompatibilities between components not specifically designed to function as a system. Designers may be highly qualified to optimize a machine's mechanical functions, but still lack the motion-centric expertise to address these micro-incompatibilities. Even if they do possess extensive motion expertise, machine designers may not have the time or budget needed to thoroughly investigate viable component configurations and put them to the test.

Moreover, even when a motion control system assembled from multiple suppliers does deliver acceptable performance for the application, there can be many additional pitfalls, including multivendor integration issues and vendor accountability when some aspect of the system fails to perform as expected.

A motion-centric, systems-based approach simplifies machine design and maximizes performance.

To achieve a truly optimized system, a single motion-centric supplier that offers a systems-based design approach is likely to deliver better performance results than a solution based on integration of individual components, whether from a single vendor or multiple vendors. As an additional benefit, a vendor-optimized system can minimize the time and expense that would otherwise be required to select individual components and validate their performance as a system.

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Few motion vendors design their components to work optimally together as a system. True motion-centric system design requires understanding how the performance characteristics of each component affect the whole system. In other words, the system must be designed with an eye towards achieving maximum performance of each component—but more importantly, maximum combined performance of all components working together.

For example, motor windings should be matched to the available voltage and current output of the drive. The composition of the motor's stator lamination should take into account the thermal effects of the drive's carrier frequencies. These are just two of the many component interactions that can be harmonized to achieve the highest overall system performance—but only if the vendor is committed to investing the necessary resources to understand the complex web of technical interactions and how to bring them into balance.

Balance means that components perform as efficiently as possible, not only individually but also together as a system. In a balanced system, there's no underperformance to prevent the motor or drive from achieving its full rated capacity, and there's no excess, wasted performance that could put undue stress on the motor or drive.



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Beyond exceptional performance, components specifically designed to work together as a system also provide these additional benefits:

Efficient Implementation.

All interface needs are designed into the system to simplify integration into the machine. For example, cables designed specifically for the voltage, current, and noise immunity requirements of the system allow for quick plug-and-play installation and eliminate unwarranted expense. When a system is intentionally engineered to work together, setup is seamless and a single supplier can troubleshoot should you ever have any problems.

Motion-Centric Capabilities That Simplify Overall Machine Design.

Motion safety, regeneration, and filtering are all integral elements of a complete motion system. Machine engineers can spend less time determining filter requirements, regeneration components, and even certain SafeMotion elements, gaining more time to focus on critical machine performance characteristics.



A Complete Breadth of System Solutions.

A motion-centric, single-source supplier can offer systems-based designs across a broad range of technologies, providing a significant advantage through right-fit, optimized systems for practically any motion requirement. Many innovative machines incorporate more than one motor type to achieve various integrated functions. Using a systems-based design approach, a motion-centric supplier can offer conventional servo motors, rotary and linear direct-drive servo motors, cartridge and frameless designs, stepper motors, and servo and stepper drive electronics to achieve optimal performance across multiple applications.

Design Flexibility Through Co-Engineering.

Drawing upon extensive experience addressing intricate motion applications, a qualified motion-centric supplier can help customers find new ways to improve machine performance. A motion supplier that offers co-engineering capabilities can take high-performance thinking directly into the customer's design process. Because a true systems-based motion system is highly adaptable, a co-engineering partnership can identify opportunities to achieve the best possible fit and function through mechanical adjustments, control software modifications, and more.

Consider the possibilities.

Kollmorgen's new-generation 2G Motion System is today's leading example of a motion-centric, systems-based approach, providing many system-wide advantages that address the needs of the most challenging motion applications. AKM2G servo motors, AKD2G servo drives, 2G cables, and supporting components are all perfectly matched to deliver maximum performance without compromise.

Here are just a few of the ways the 2G Motion System can help engineers design a better machine and bring it to market faster, for less:



Reduced Design Envelope

With torque and power comparable to existing motors, but in a smaller package, AKM2G servo motors reduce the footprint required to achieve the machine's performance goals. Further size reductions can be achieved through customizable mounting and simplified cable management thanks to a single-cable power/feedback design. AKD2G Dual-axis drive packages with integrated filtering, regeneration, and SafeMotion options reduce cabinet space and cooling requirements. In addition, direct-drive technologies eliminate the need for gearboxes and other mechanical transmission components.



Increased Dynamic Performance

Increased torque and power in the same size package can decrease indexing time through faster moves. Conversely, similar torque and power in a smaller motor with less rotor inertia can improve dynamic performance to decrease move and settle times. Both options help engineers achieve greater machine productivity. Performance-tuning capabilities integrated into the drive software also improve dynamic performance by overcoming machine mechanical challenges. A full breadth of solutions includes additional motor technologies—such as embedded motor designs and other direct-drive solutions—to further increase machine performance.



Faster Development and Commissioning

With the 2G Motion System, there's no need to shop for optimal solutions from different vendors and evaluate their performance in different combinations. Likewise, there's no need for blind faith that a single-source vendor has actually done the hard work of optimizing components to work together as a system. The 2G Motion System was designed to deliver full performance in every system configuration, so machine engineers and builders can focus on bringing a better machine to market, faster.



Machine Cost Savings

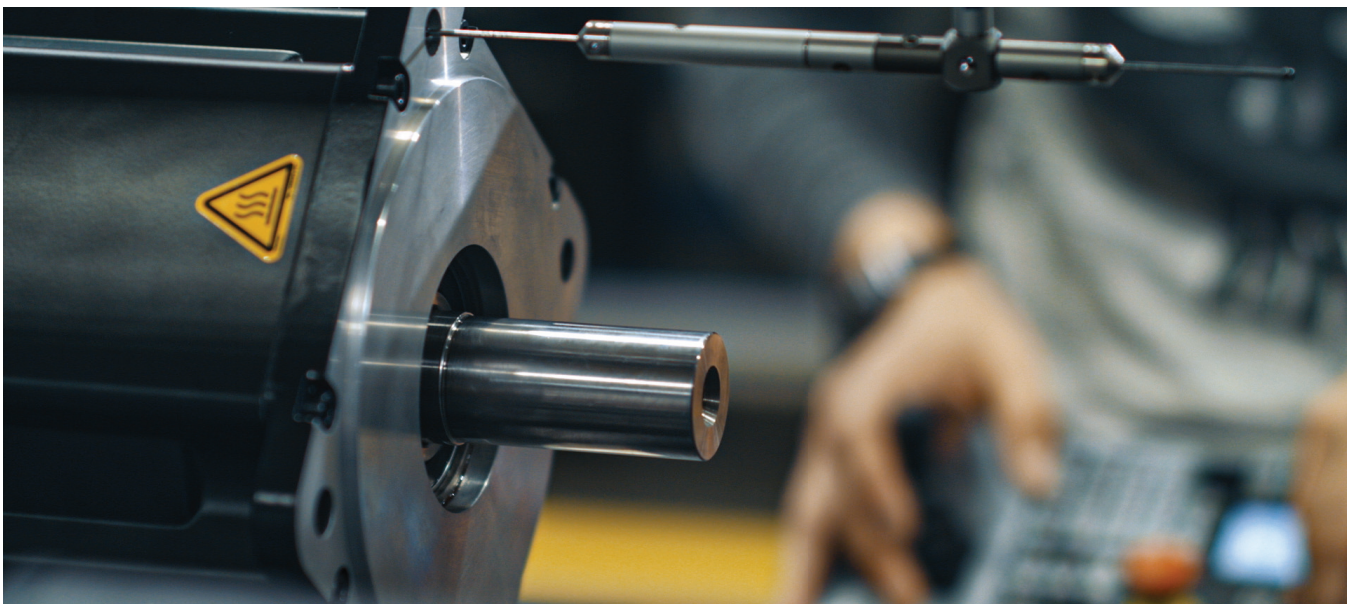
Single-cable design, dual-axis drives, and co-engineered options reduce material and machine-assembly costs. Direct-drive solutions can further reduce parts counts and machine build costs. Improved motor and drive efficiencies reduce energy consumption, lowering operational costs for end users and providing manufacturers with yet another differentiating advantage in the marketplace.



New thinking begins with Kollmorgen.

We believe engineers should be free to focus on developing efficient machine designs and not on time-consuming evaluation and integration of motors, drives, cables, and other components. They should be free to work with a single supplier, in full confidence that the motion system is perfectly matched to deliver optimum performance.

That's why we developed the 2G Motion System, and it's why we created a co-engineering team to help make your machine more efficient, cost-effective, and productive. We're confident you'll find no other supplier that offers the new-generation technology and thinking of Kollmorgen.



About Kollmorgen

Since its founding in 1916, Kollmorgen's innovative solutions have brought big ideas to life, kept the world safer, and improved peoples' lives. Today, its world-class knowledge of motion systems and components, automated guided vehicle navigation software, industry-leading quality, and deep expertise in linking and integrating standard and custom products continually delivers breakthrough motion solutions that are unmatched in performance, reliability, and ease of use. This gives machine builders around the world an irrefutable marketplace advantage and provides their customers with ultimate peace of mind.

Ready to discover all your machine is capable of?

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