

Packaging Solutions That Matter

Kollmorgen Motion Control Technology for Measurable Results



KOLLMORGEN

Because Motion Matters™

Perfecting the Package

As an OEM, you know there's nothing simple about making the perfect package. You must:

- Engineer automation processes that differentiate your machine from the competition
- Ensure a reliable supply of motion solutions that meet your machine's unique functional requirements
- Manage cost pressures to keep your machine affordable while maximizing your margins
- Orchestrate perfect motion across every machine process to achieve the highest possible quality, flexibility and throughput

Kollmorgen understands the challenges you face. As the world's leading motion expert, we offer best-in-class solutions proven to increase machine adaptability, availability and throughput. To reduce development cycles, time-to-market, commissioning time and overall costs. And to enable new levels of packaging innovation and quality.

We provide all the motion solutions and expertise you need. That's the perfect package.

Kollmorgen co-engineering brings measurable success

More than a solution provider, we're co-engineering experts with unmatched insight into the packaging industry's technical challenges and market requirements. Beyond optimizing technical performance, our co-engineering teams help you manage machine lifecycles and upgrades, operator training and safety, and customer service and support. We even enhance your business processes through kanban supply chain management and just-in-time delivery.

We accept your challenges as our own. That's the Kollmorgen co-engineering difference.



Packaging expertise to deliver proven benefits

Real packaging applications, real results

The most important component of a successful packaging machine is knowledge. Forming, filling, converting, wrapping, sealing, labeling and other complex packaging processes depend on the ability to meet exacting performance parameters. Specialized solutions are required to comply with regulatory mandates for hygiene, quality and safety. And growing marketplace demands for new packaging styles and materials call for industry-specific expertise that few component suppliers can provide.

With decades of experience, Kollmorgen's packaging knowledge runs deep. We offer complete, interoperable motion solutions for the packaging industry including tried-and-trusted mechatronic systems, washdown-capable motors, decentralized drives, high-performance communication options, integrated development tools and more.

The proof is in the machine, and we have achieved measurable results across the industry.

PHARMACEUTICAL



- 21% more throughput
- 23% lower material costs
- 52% higher profits

HIGH-PERFORMANCE CUTTING



- 28% higher productivity
- 23% less waste
- 24% less programming effort

CONVERTING



- 33% lower material costs
- 21% lower service costs
- 100% pinch points eliminated

FORM/FILL/SEAL



- 37% more throughput
- 25% lower material costs
- 33% longer motor life

FOOD AND BEVERAGE



- 42% lower energy requirements
- 21% less development time

Kollmorgen's Domain Knowledge Makes the Difference for High-Performance Packaging Machines

Kollmorgen has deep experience and a consistent record of success in the packaging industry. Applying our extensive domain knowledge to specialized application challenges, we have helped packaging OEMs around the world achieve measurable results. These pages present a few representative examples.

A 50-axis blister packaging machine provides extreme throughput and a platform for the future

KOCH Pac-Systeme GmbH of Germany designs and builds blister packaging machines for batteries, contact lenses, household goods and many other consumer products. Among KOCH's most complex and ambitious projects is a packaging machine designed and built for one of the world's largest toothbrush manufacturers.

With 23 axes for blister production and 27 axes for packaging processes, the machine creates 12 toothbrush packages per cycle at a rate of 20 cycles per minute. That's 14,400 packages per hour, with each package holding 4 toothbrushes – a total of more than a million toothbrushes packaged for every 18 hours of operation.

A future-ready servo drive

This high-performance packaging machine is part of a KOCH initiative to address customer demands for ever-increasing product throughput, variety, sophistication and quality. To take its packaging platforms to the next generation, KOCH needed a drive solution that could precisely control highly dynamic processes across multiple axes. Kollmorgen servo drives provide best-in-class motion control along with several state-of-the-art features that advance KOCH's strategic goals. For example:

- Highly flexible support for advanced field bus, motor and sensor technologies
- Integrated safety functions
- Functions that simplify fault recovery to minimize downtime and maximize productivity

Advanced communication options such as CANopen® and EtherCAT® are provided through an internal FPGA, so KOCH can synchronize multiple axes with accuracy measured in microseconds, while avoiding the need to purchase expensive option cards.

An affordable solution to a common problem

One issue that often plagues packaging machines is the difficulty of re-referencing the machine after a fault. In the past, KOCH had to save sensor positions on an expensive external memory card to avoid the need for re-referencing after an emergency stop due to an overrun of the multi-turn absolute value sensor. Now, the Kollmorgen servo drive performs this function with no need for additional hardware.

For KOCH, Kollmorgen is the competitive edge

"The Kollmorgen servo drive meets our needs for flexible integration, stability and improved production throughput times," says Jürgen Welker, KOCH's head of automation technology and service. "Its technical refinements produce excellent control behavior and a high degree of automation." With Kollmorgen technology, co-engineering and support, KOCH is building safer, faster, more flexible machines than ever before. And looking forward to creating even more remarkable machines in the years to come.





Kollmorgen's servo technology moves more than 4,000 axes in PFM packaging machines worldwide

The PFM Group is a worldwide network of seven companies that provides flexible packaging solutions for food and other industries. Anchored by the head office of PFM Packaging Machinery in Italy, the group designs, produces and markets vertical form/fill/seal machines, feed systems such as automatic handling machines, accessories and parts for numerous machine processes, and complete packaging lines.

Production machines from the PFM Group are used to package pastries, cheeses, meats, vegetables, fruits, sweets, pharmaceutical products, cosmetics and more. To handle all these packaging applications, the PFM Group needed a supplier that could provide the optimum servo equipment across a very wide range of technical requirements. By choosing Kollmorgen, the PFM Group has gained:

- Adaptability, with access to the widest selection of the most versatile servo drives and motors and state-of-the-art integration capabilities to meet any packaging need
- More efficient development supported by Kollmorgen's packaging-specific co-engineering expertise
- Improved customer responsiveness through our global product availability and kanban-based management practices



Simplifying development of more capable machines

Kollmorgen's product flexibility gives PFM affordable choices for design changes and upgrades. For example, it's easy to replace a drive communicating over CANopen with a drive communicating over Profibus within the same product family, without replacing the axis wiring. And Kollmorgen co-engineering removes much of the engineering burden and cost from PFM Group, helping speed the time to market for machines that are ideally suited to any application requirement.

Ensuring a reliable supply to maximize useful life

Kollmorgen provides lean manufacturing and just-in-time delivery to help meet the most urgent delivery deadlines while minimizing warehouse stocks and costs. The PFM Group can depend on access to the parts it needs to keep its machines productive, and to add new functionality as the packaging market evolves.



Kollmorgen servo technology drives high-throughput, high-quality packaging for a wide variety of noodle and snack products

One of South Korea's largest and most rapidly growing companies is a producer and packager of instant noodles and rice products, snack foods, fruit juices and bottled mineral water. The company operates several Korean factories as well as production sites in China, Japan, Dubai and the USA, leading the Korean market and serving approximately 80 additional markets worldwide.

Sustaining its growth while maintaining the highest quality standards was no longer possible with the antiquated mechanical packaging system the company had been using for its multipack packaging applications. A new servo-based motion solution was needed to optimize packaging quality, flexibility and speed. Kollmorgen was chosen over competing suppliers for the easy commissioning and the high stiffness, accuracy and reliability of its servo solution. Now the company is extending its market lead with a revitalized packaging system that benefits from:

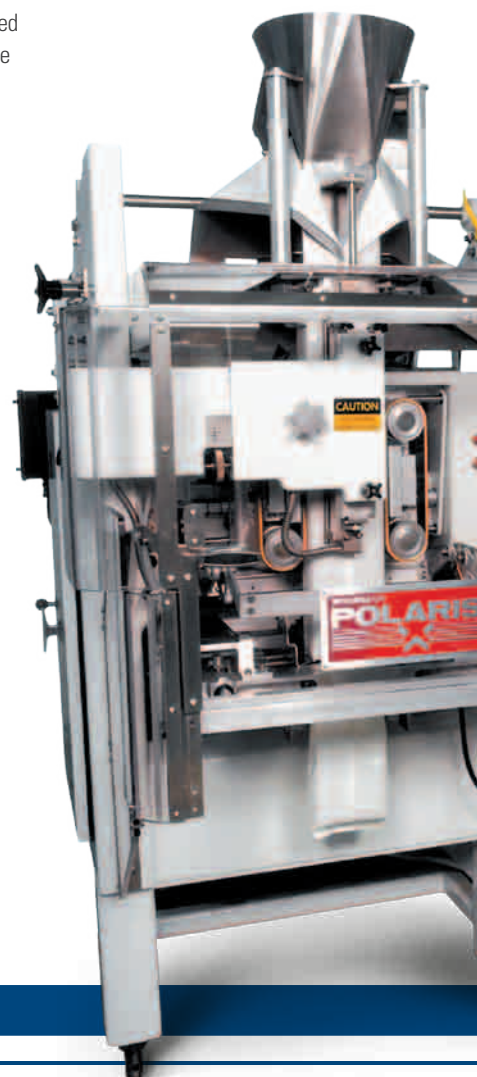
- **A high-speed, coordinated motion solution.** Compared to competing suppliers, the Kollmorgen solution offers greater torque density and more precise positioning, enabling the packaging machine to achieve 60% higher productivity.
- **Effective co-engineering.** Kollmorgen's co-engineering team helped the company design a more versatile and effective machine, without the expense, delay and supply problems of a highly customized solution.
- **Superior programming for superior results.** Kollmorgen's fully integrated programming tools and packaging-specific programming expertise helped the company achieve the best possible performance results, faster.

A field-installable upgrade kit brings higher performance and longer machine life

After 20 years on the market, the world's best-selling bagmaker was due for a third-generation performance upgrade. Kliklok-Woodman, based in Georgia, USA, turned to Kollmorgen to help co-engineer a high-performance replacement for the machine's outdated servo drives and motors. The goal was not only to significantly increase performance and reliability for the newest models, such as the Polaris E, but also to provide an upgrade kit that could be easily installed in existing machines on-site to extend their lifecycle and take their performance to new levels.

Once Kliklok-Woodman presented their problem, Kollmorgen co-engineering delivered the right solution. Kollmorgen provided the right know-how to develop the entire kit in close collaboration with the Kliklok-Woodman engineering and customer service teams. The upgrade kit provides complete servo control and costs less than a basic replacement motor of the original type. The very successful Polaris machine series, which have been in production for years, are now taking advantage of Kollmorgen's fully integrated servo technology to provide:

- **Reduced downtime.** The new components can be installed, tuned and maintained in a fraction of the time previously required.
- **Improved performance.** The updated Polaris provides increased throughput and reliability with reduced noise and vibration.
- **A longer lifetime.** With the Kollmorgen upgrade kit, packaging machine operators are saving on costs and gaining assurance that their machines will give the best possible service for years to come.



Higher performance means higher sales thanks to an affordable stepper solution

Matrix Packaging Machinery, Inc. based in Saukville, Wisconsin, USA, needed an affordable stepper motor and drive for its vertical form/fill/seal machine to be sold in Asian markets. But competing on price alone wouldn't be enough. To win sales, the machine would need to make a real difference in product quality and throughput. That's why Matrix chose Kollmorgen over other suppliers that could match the price, but not the torque, precision and consistency of our stepper solutions.

According to project Engineer Mike Krummey, the choice of Kollmorgen was a deciding factor in helping Matrix achieve its primary goal for the machine: higher sales. "All three axes in our machine are now operated with a step drive and motors from Kollmorgen," Krummey says. "Our choice has solved all the problems regarding torque, precision, quality, service and support. The costs met our price expectations, and the package also came with additional functions that translated into higher sales figures immediately, reflecting customer satisfaction." For Matrix Packaging, Kollmorgen step drives and motors offer:

- **Low cost for high performance.** The Kollmorgen drive incorporates microstepping technology that delivers precision and performance comparable to many servo systems, but at a significantly lower total cost.
- **Less downtime and waste.** The Kollmorgen drive includes an open loop stall detection feature that can detect a film jam or break and stop the machine. Matrix markets this as its "worry-free package," and it helps minimize downtime and scrap without the need for a separate sensor.
- **More power and performance in a smaller, more affordable package.** Kollmorgen motors lead the industry in torque density. So Matrix machines gain all the power and performance they need without the expense and space of a larger motor.



A 67% faster machine opens up new markets with larger customers

Profitpackaging, Inc. wanted to boost the performance of its flagship machine in order to increase its market share – and its profits. The company, based in Warsaw, Missouri, USA, manufactures note and label applicators for the newspaper and commercial printing industries. Profitpackaging's goal was to increase throughput from 600 to 1000 labels per minute in order to reach publications with a larger circulation than its existing client base.

The Kollmorgen team helped Profitpackaging replace the P3 Note and Label Applicator's stepper system with an AKD™ servo drive and AKM™ servomotor. Although the new servo system itself costs more than the stepper system, the cost was justified by the elimination of sensors, gearboxes and other components that could be removed because they were no longer required. Now, the company offers a significantly faster, more scalable labelling machine that offers several competitive advantages:

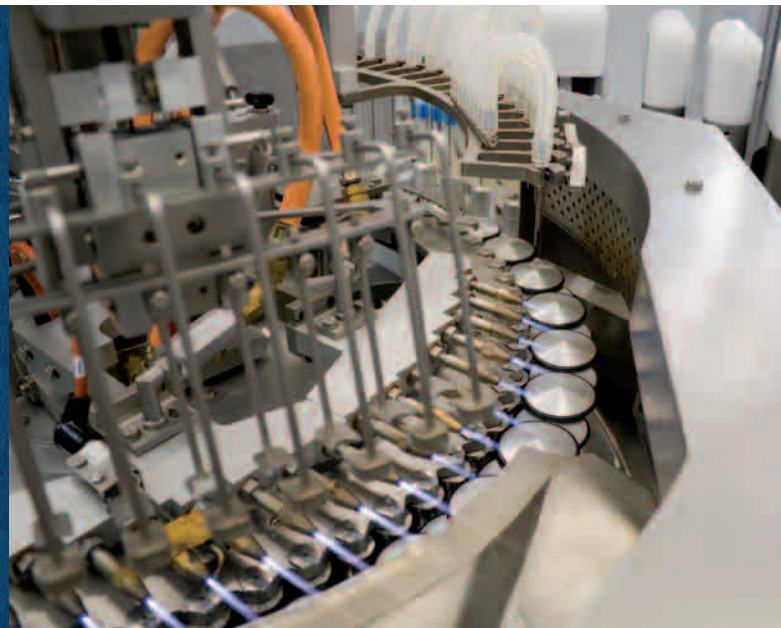
- **Reduced complexity and increased performance.** The AKM's advanced autotuning algorithm compensates for mismatched inertia in the labeling machine, eliminating the need for a gearbox. As a result, the machine operates with greater accuracy and requires less maintenance.
- **Faster throughput.** Because the new servo system offers much greater bandwidth than the previous stepper system, it provides quicker acceleration and deceleration with greater positioning accuracy, so the machine can run at least 67% faster.
- **Lower warehousing costs.** The new design eliminates the need for specialized, machined parts. So inventories can be smaller, and procurement is quicker and easier thanks to the dense Kollmorgen supply network.



Motion control expertise

For more than 70 years, Kollmorgen has provided motion solutions that make industrial machines more productive, precise and powerful. Successful packaging applications require high performance motion control solutions for demanding machine requirements such as:

- Highly dynamic acceleration and deceleration
- Fast, intelligent, precise motion control
- High-torque applications
- Coordination and synchronization of motion across multiple axes



Motion is at our core

We understand the packaging industry's most difficult motion challenges. One common example is high-speed registration. Servo drives must be able to achieve the following operating characteristics in order to coordinate high-speed motion based on registration marks:

- Drives must be able to record and convert registration marks in less than 5 milliseconds to avoid unacceptable offsetting.
- A corrective movement must take place while stipulating a cam profile within 15 microseconds.
- To achieve correct results, position error must not exceed 0.03 mm.
- Drives must operate with ideal synchronization at thousands of cycles per minute to keep processes moving accurately at full speed.

The performance of the motion control system is a key factor in allowing drives to meet the required dynamics and response times. In combination with the high dynamics of the motor-controller combination, the motion control system must be able calculate target values for all drives at 4 kHz intervals (every 250 microseconds) and to communicate these values to the drives via high-speed EtherCAT.

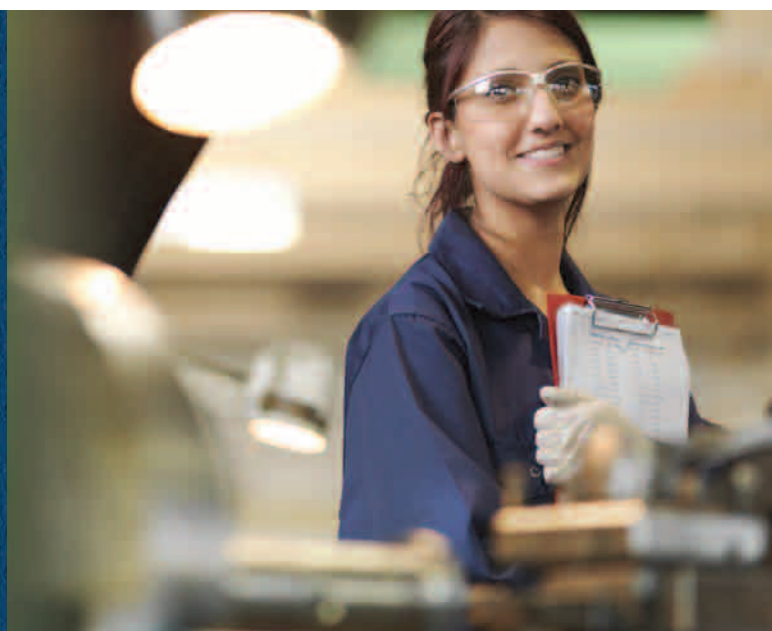
Kollmorgen understands strict motion requirements like these, and has the expertise, optimization tools and integrated automation components to reliably meet them. Kollmorgen Automation Suite™ provides a fully integrated development platform designed to meet the needs of highly dynamic applications while simplifying programming, ensuring quality and improving machine performance by as much as 25 percent.

Kollmorgen Automation Suite combines all the main functions of a high-performance control system, including motion control, PAC and HMI. It can be used to develop and simulate highly complex processes across as many as 128 axes. The suite is optimized for machine performance and programming flexibility, offering both PLCopen programming based on IEC 61131-3 and our innovative PipeNetwork™ graphical programming environment.

It's just one example of the many solutions we offer to drive the highest possible machine and business performance for packaging machine manufacturers.

Commercial services

Your enterprise relies on more than your machine. Kollmorgen's commercial services enhance our best-in-class motion solutions to complete the co-engineering experience. Components that perfectly fit your machine's technical requirements are only the beginning. We also tailor our commercial services to perfectly fit your business model and enhance your competitive position.



Supply chain optimization

Long-term success and growth of your business depends on reliable product availability and your ability to deliver on time and on budget. More than motion control components and expertise, we offer co-engineering support to help you manage your supply chain and control costs. Through kanban supply programs and the continuous-improvement methods of the Danaher Business System, we provide short lead times and reliable on-time delivery. You can count on continuous supply while minimizing your inventory requirements. Your costs are lower as a result, freeing up working capital so you can become more responsive in a market environment where product availability is a driving success factor.

Aftermarket revenue protection

Our custom part numbers and OEM part protection services ensure that you receive full aftermarket revenues throughout the lifecycle of your machine. We can even administer the program on your behalf through our global sales and support network. Instead of competing for the aftermarket service business for your own machines, you maintain the control you need to ensure customer satisfaction and capture all the revenue you're entitled to.

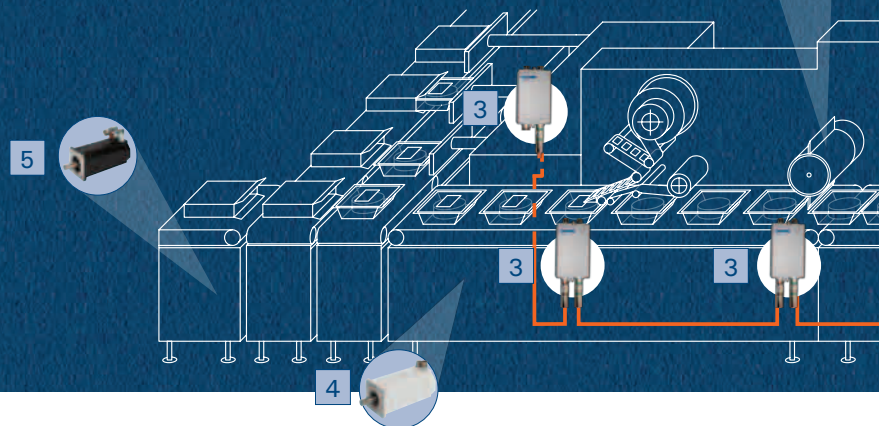
Machinery improvement services

Our global team of automation design experts can evaluate your existing machines and your next-generation designs, recommending strategies to improve performance and add functionality. Kollmorgen brings years of experience to form/fill/seal, blister packaging, flexo and gravure printing, cartoning, corrugating, and food wrapping applications. In particular, our strong focus on web-based motion control can make a real difference in your machine design, generating measurable benefits.

Machine lifecycle enhancement

Markets grow, technology evolves and customer expectations change. We can help you keep pace, with solutions and expertise that keep your machines fully productive throughout their lifecycle. We can even create upgrade paths that enhance your machine's throughput and functionality, extending its lifecycle into a new generation. The benefit: no surprises, and no need to deploy your valuable engineering resources to support a machine nearing the end of its lifecycle.

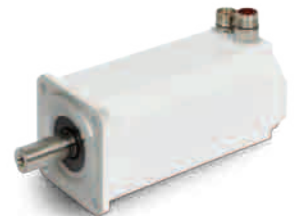
Innovative Products and Co-Engineering Expertise for a Complete Solution



1

Industrial Controls

Kollmorgen Automation Suite™ dramatically shortens development time while increasing machine throughput by as much as 25 percent or more. Our exclusive Pipe Network™ provides a drag-and-drop representation of your machine to enable quick, error-free programming of complex, multi-axis motion.



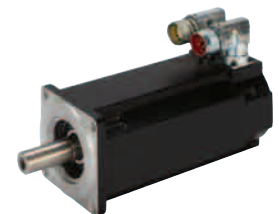
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2

Servo Drives

Kollmorgen drives combine performance, flexibility, and ease of use with Kollmorgen Automation Suite and all Kollmorgen servomotors and linear positioners. Multiple communications bus options, plug-and-play commissioning, exclusive Performance Servo Tuner algorithm, multiple feedback options, and industry-leading torque and velocity loop bandwidth provide you the flexibility to bring the right solution to your machine.



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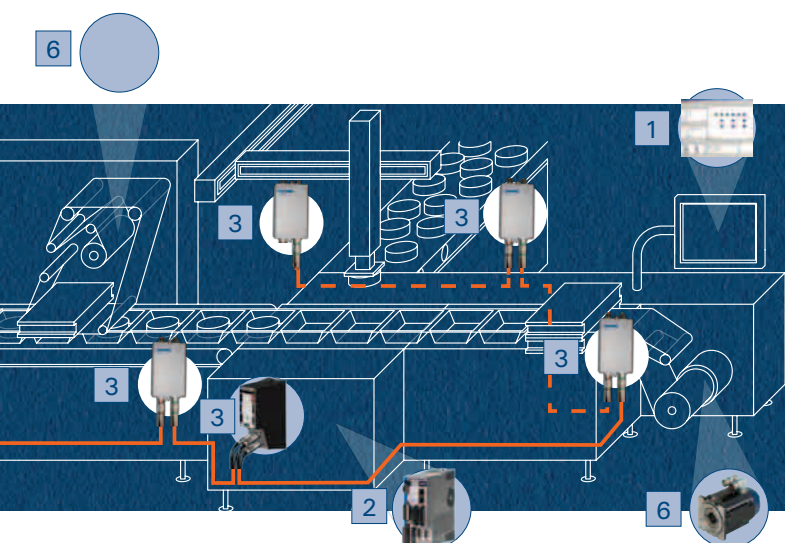
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Decentralized Drive Technology

Kollmorgen's AKD™ Near and Integrated servo drives provide lower total system costs and save space in multi-axis OEM packaging machines by reducing cabling requirements and cabinet size. The AKD Near Drive provides all the benefits of an IP65 protected decentralized drive installed directly on your packaging machine without any de-rating of the motor or drive.



6



Kollmorgen provides the largest selection of the most innovative motors, drives, controls, gearheads, and linear positioners, including a complete range of products adapted specifically for the packaging industry. If we don't have exactly what you need, we can co-engineer components to your specifications.

Servomotors

- 4 AKM™ food grade and washdown servomotors provide hygienic solutions with all the performance of the high torque density AKM.
- 5 AKM servomotors provide the highest torque density, and the largest number of co-engineered offerings (500,000+ part numbers and growing), all available globally for rapid delivery.

Direct Drive Motors

- 6 Cartridge DDR™ technology simplifies machine design by eliminating wearing parts and improving servo performance.
Direct Drive Rotary (DDR) motors eliminate transmission components to minimize maintenance and increase performance.
- 7 KBM™ frameless motors provide the best mechanical fit for tough applications that require the smallest form factor.

The Kollmorgen Difference

Better motion differentiates your machine through new packaging capabilities, higher quality and throughput, reduced risk and a faster time to market. Kollmorgen delivers:

- Not just motors and drives – fully integrated solutions co-engineered for true innovation
- Global design, engineering, manufacturing and support, with lead times among the lowest in the industry
- Unparalleled market insight coupled with the product breadth, depth and flexibility to meet customer needs
- A proven history of financial stability and market success
- Reliable, long-term supply and engineering services so you can build a better machine today, keep it productive, and continue to enhance it far into the future

Find out how we can work together through co-engineering to differentiate your machine.

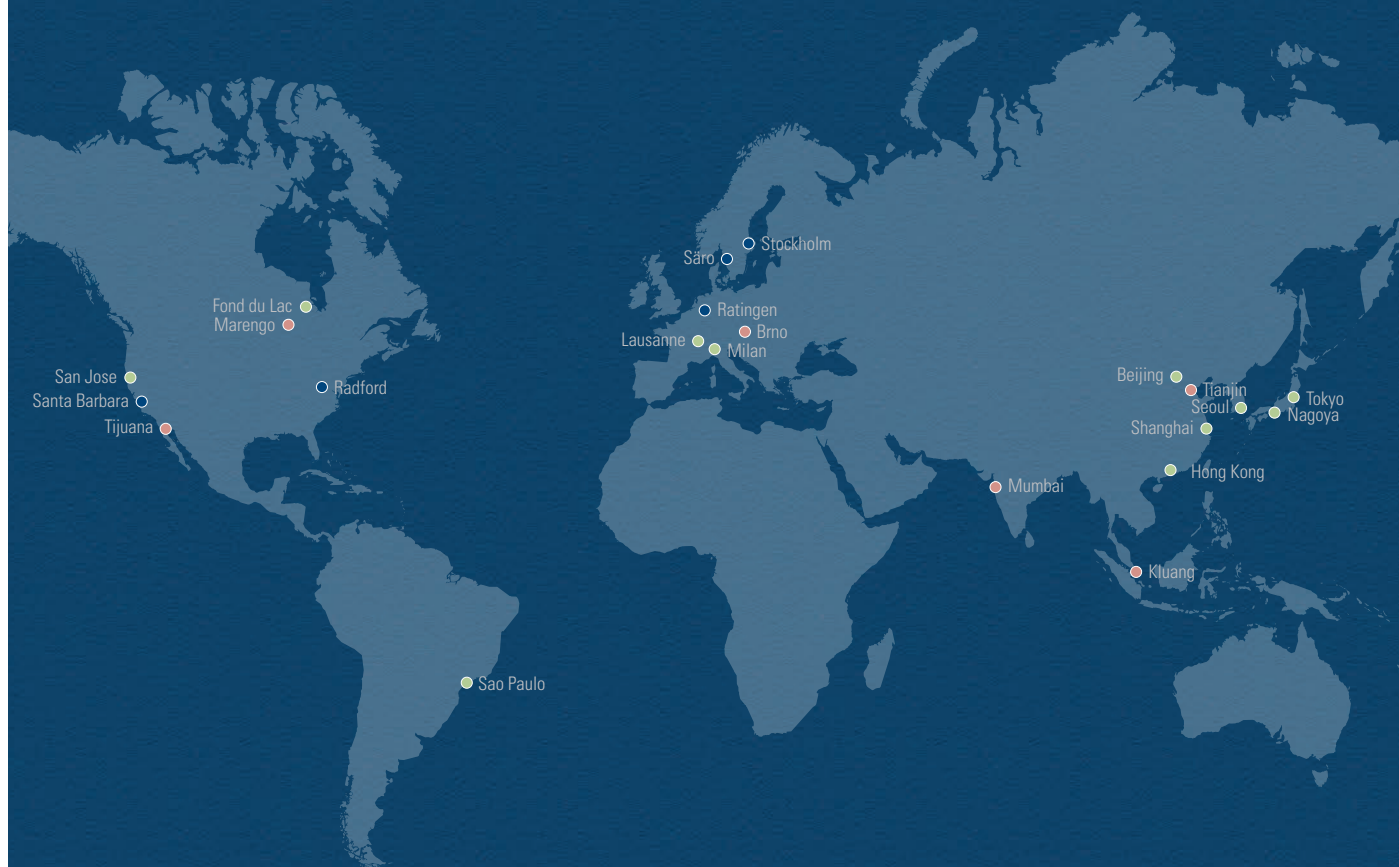
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About Kollmorgen

Kollmorgen is a leading provider of motion systems and components for machine builders. Through world-class knowledge in motion, industry-leading quality and deep expertise in linking and integrating standard and custom products, Kollmorgen delivers breakthrough solutions that are unmatched in performance, reliability and ease-of-use, giving machine builders an irrefutable marketplace advantage.

For assistance with your application needs visit www.kollmorgen.com for a global contact list.

- Application Centers
- Global Design & Manufacturing
- Global Manufacturing



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