

# LINNEAR

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# What's Inside

EDITORIAL

Dear Readers,

Success stories rarely follow a linear path. They are characterised by challenges and opportunities, iterations and rotations. With LINEAR we want to tell you these stories. Stories of entrepreneurs who break new ground with LinMot, of developers who overcome obstacles with our support, and of customers who achieve their goals with our products and services.

Over the last few years we have worked hard to develop our technology and products. We have done this by focusing on your needs. Because your satisfaction is our ultimate goal.

That is why in LINEAR you will find not only inspiring interviews and informative facts, but also our innovative new products that will help you write your own success story in the most linear way possible. We hope you will be motivated and inspired by our application reports and innovations and look forward to helping you on your path to success.

We wish you an exciting read and look forward to your feedback on LINEAR.

The Editorial Team

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**Sustainability or efficiency?**

About 15 years ago, this was indeed a decision question where sustainability ruled out efficiency or efficiency ruled out sustainability. Today, however, the cooperation between GARDEMA and LinMot shows that climate-friendly industrial production and increased efficiency do not have to be mutually exclusive, but can even lead to further benefits with the right actuator technology.

For the partnership between GARDEMA and LinMot makes a double contribution: on the one hand, products are created that deal with natural resources in a way that is footprint-friendly, and on the other hand, new manufacturing processes are developed that help to efficiently reduce the consumption-induced water usage in industrial production.



**Everyone is talking about the need for a fair and ecological recycling economy. In recent years, sustainability strategies have set a common goal of defining new standard criteria to meet this need, intended to bring about a climate-friendly turnaround in the packaging industry. But there are still a few pieces missing from the puzzle of holistic, resource-friendly operations.**






To fill in the gaps in this ecological industrial design model, the partnership between KRÖNING - Automation and LinMot is based on a future-oriented idea: sustainability efforts must begin with the engineering of machinery for sustainable production.



200 million litres of milk and 60 million litres of cream. These impressive quantities of liquid are processed each year at Emmi's Mittelland Molkerei AG in Suhr. Right in the middle of it all: LinMot's linear rotary motors and wing-cap closures.





The highlight of the wing-cap closure is that the sealing disc is directly connected to the cap after closing, so that it opens easily and effortlessly when the wing cap is opened for the first time. Precise twisting of the wing-cap closure is crucial for an efficient and reliable closing process. This is why the renowned machine manufacturer Tetra Pak relies on lineal rotary motors from LinMot.

# Not a drop in the ocean

**HOW TO GET WATER DROP BY DROP TO WHERE PLANTS NEED IT - TO THE ROOTS.** The cooperation between GARDENA and LinMot, climate-friendly industrial production and increased efficiency are not mutually exclusive.

TEXT MIHALY VIDOVENYECZ

**130**  
litres/day

This is how much water every person in Germany uses every day for drinking, washing, cleaning and cooking.

**7200**  
litres/day

Including the water used to produce food, drinks, clothing and other consumer goods, the water footprint is around 7,200 litres per day per person, or 219 billion cubic metres per year for the whole of Germany.



# The Solution

Regardless of the size, material, contour or complexity of the parts to be processed, complete pick-and-place processes are implemented sustainably with LinMot linear modules and linear-rotary motors.

**Both our products and their production should be more ecological, more efficient and more economical.**

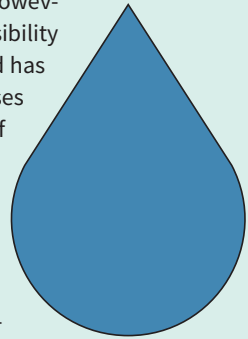
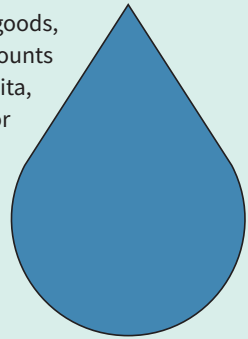
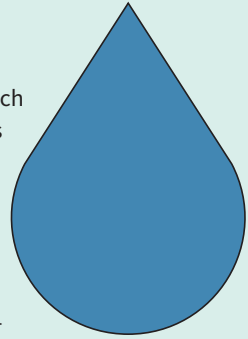
Heribert Wettels, Communications Manager of Public Relations at GARDENA

Just think of the battery-powered lawn edger back in 1973 or the watering computer from the 1980s, GARDENA has always proven to be a particularly sustainable innovator. However, the age of Industry 4.0 and the increasingly clear ecological and economic limits of resilience also present the globally active subsidiary of the Swedish Husqvarna Group with the challenge of producing in a more networked, faster and, above all, more environmentally friendly way. Fundamental prerequisites for future-oriented and sustainable production have already been met thanks to a partner: With state-of-the-art linear and linear-rotary technology from actuator specialist LinMot, GARDENA

has succeeded in redefining the precision, speed and sustainability of its production facilities.

### Back to the roots

130 litres per capita. This is how much water every person in Germany uses every day for drinking, washing, cleaning and cooking. A considerable amount, but only a fraction of the actual total consumption. This is because an often invisible indicator, so-called virtual water, contributes much more to the overuse of water resources. If this embedded water, which is needed for the production of food, beverages, clothing and other consumer goods, is included, the water footprint amounts to around 7,200 litres per day per capita, or 219 billion cubic metres per year for the whole of Germany – according to the results of the research project at the Technical University of Berlin. There is no doubt that industrial manufacturers in many sectors with their production facilities, some of which are the size of halls, have a significant share in the exploding figures for consumption-induced water usage. However, GARDENA is aware of this responsibility and the associated consequences and has been designing its production processes for decades with an ecological view of the future of water. “Both our products and their production should be more ecological, more efficient and more economical”, is how Heribert Wettels, Communications Manager of Public Relations at GARDENA, briefly sums up the company's philosophy. The fact that this philosophy has always been lived practice is best demonstrated



<sup>1</sup> Conceptual further development of the water footprint to map possible qualitative and quantitative water impacts along a product life cycle. Jonas Bunsen, Dr. Markus Berger, Prof. Dr. Matthias Finkbeiner, Department of Sustainable Engineering, TU Berlin, Ed.: Federal Environment Agency Germany, 2022 17

**The advantages of the LinMot linear modules enable us to move much more gently on the drive and machine and at the same time faster without jerky movements.**

Felix Kaifell, Head of Software Design at GARDENA

system behind it and its drive technology,” says Reinhold Steck, construction manager for special machine construction at GARDENA, explaining the technical aspects of the change. As the MDS system is already in its fourth expansion stage, this advancement in the manufacturing processes also had to take place at almost all levels of the drive technology. “In the first three expansion stages of the MDS, conventional solutions were in use,” says construction manager Steck. Since the new system generation was to offer more basic and process reliability, increased precision in force control and process parameters as well as optimised sustainability and energy efficiency, the path for the special machine construction department inevitably led to a manufacturer, according to Steck, “where we finally found the solution for our demanding pick-and-place tasks. Because it is precisely in these →

by the Husqvarna subsidiary's modular drip irrigation system, which has been the absolute market leader in the consumer sector for decades. The Micro-Drip System (MDS) is a resource-efficient irrigation solution that delivers water drop by drop to where plants need it: the roots. “The very first version of the MDS was launched in 1985. That was long before the big sustainability debates and droughts in Europe,” says Heribert Wetters, Head of Communications, explaining the history of the irrigation system's origins, underlining the company's environmentally conscious approach, which has also had an impact on the automation technology of the production facilities over the years. “Since the new generation of the Micro-Drip system was renewed from the ground up, it was also necessary to further develop the production



linmot.com

**READY-TO-INSTALL WITHOUT ENGINEERING**

## **LinMot linear rotary motors**

Linear rotary motors from LinMot are characterised by excellent flexibility, dynamics and speed. They combine two electromagnetic servo motors in just one slim housing and thus enable combined linear and rotary movements in the simplest way. Find out more!

GARDENA gave us a fascinating insight into the production of its biggest seller. Find out from our video how the Swedish Husqvarna subsidiary has managed to redefine precision, speed and sustainability of its production facilities with our technology.



youtube.com

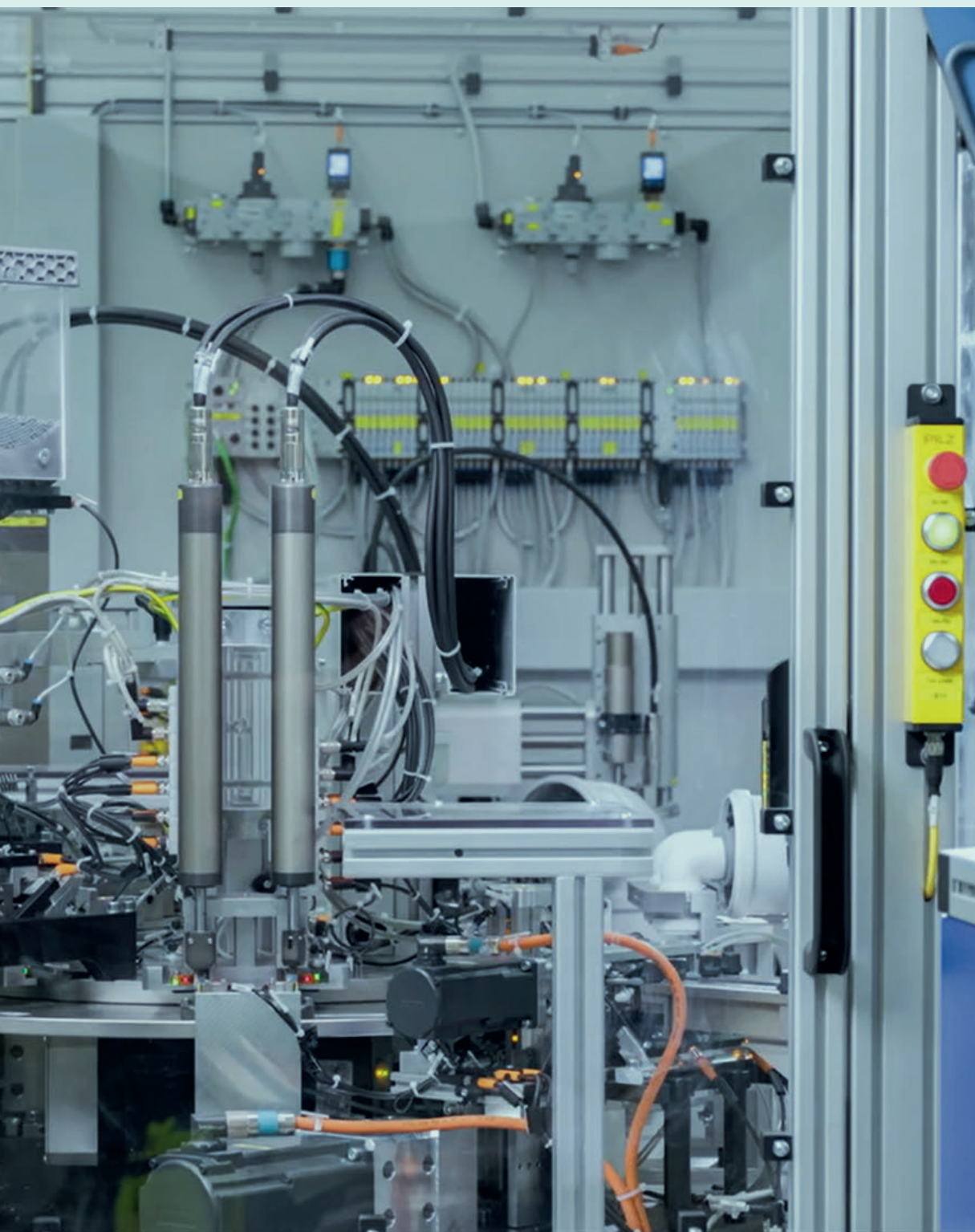
processes that the LinMot drive systems are unbeatable in terms of their dynamics and precision.”

### **PR02 – Precision at the touch of a button**

Implementing industrial systems for precise and dynamic closing, screwing or assembly is an extremely complex challenge with conventional servo solutions. The various components, such as the two types of servo motors, grippers, hoses, sensors, etc., must be coordinated with each other and included in the engineering. This makes the realisation of efficient industrial machines planning-, material-, cost- and time-intensive and yet does not promise the full precision and versatility in the processing – as is the case, for example, with the Micro-Drip-System from GARDENA – of small dimensioned components. For example, the row dripper for row crops and the end dripper, which is ideal for watering selectively and saving water even with height differences, are very small and therefore require a new level of assembly precision. “With two servo motors, it is →

Fully automated processes thanks to LinMot components: Regardless of the size, material, contour or complexity of the parts to be processed, complete pick-and-place processes are implemented quickly, cost-effectively and sustainably with LinMot linear modules and linear-rotary motors.





The absolute all-rounder for pick-and-place applications: The outstanding modularity and combinability to two-axis systems as well as accelerations up to 50 m/s and speeds up to 5 m/s make conventional solutions look old-fashioned and make the LinMot DM01 modules unrivalled in every customer application.





possible to operate in a force-controlled manner, but with the large mass that has to be moved, the precision required with MDS systems is lost," says construction manager Steck, explaining the basic problem of small-part assembly with classic servo drives. This is where the first decisive unique selling point of the PR02 motors becomes apparent: thanks to the decoupled rotary servo motor of the LinMot linear rotary modules, only the motor shaft needs to be accelerated or braked, which means that the mass that needs to be moved is much smaller, both rotationally and linearly, and the feed force can be very finely defined, even in vertically aligned processes.

But it is not only the processes in the GARDENA plants that benefit from the properties of the PR02 motors. LinMot, as market leader in the field of tubular servo motors recognises all customer needs: Whether for screwing, assembling or capping, the linear rotary motors of the PR02 series also stand out due to their high flexibility, dynamics as well as safety and networking. Exactly reproducible and recordable motion sequences are ensured by calibratable force and torque sensors which, in addition to the setpoints provided from the servo controller, offer the possibility of monitoring and evaluating process parameters such as press force, torque, angle or linear position available in real time for each process with an accuracy of better than or equal to 1% of the nominal value. "This also allows the control parameters to be matched much more precisely to

the respective component contour," confirms Mr Steck, pointing out the resulting benefits for GARDENA: "Thanks to the precision of the LinMot PR02 motors, our systems are more process-stable and the reaction and cycle times have become significantly shorter," says the construction manager. Whereas 15 years ago a cycle time of 6 to 7 seconds was completely sufficient for the production conditions and quantities at that time, the MDS systems and the LinMot linear rotary motors used in them are now designed as high-speed machines and operate with an output time of 1 to 2 seconds, and even in two lanes. "These cycle times are no longer feasible pneumatically," says construction manager Steck, pointing to the row dropper already mentioned. Thanks to the LinMot PR02, this can be screwed to the T-piece in just 0.3 seconds.

In addition, the LinMot components can meet other special requirements that result from the special position of the GARDENA design department: "A high degree of flexibility of the drives is particularly important for us, as we are always developing new, →

ALL-IN-ONE INSTEAD OF COMPLEXITY

## LinMot linear modules

LinMot linear modules & guides are precise, ready to install linear systems that are energy efficient and require minimal installation space. These products offer high guidance accuracy and facilitate dynamic and precise positioning of the load while supporting external forces, torques, and bending moments. The product portfolio covers different strength classes with all required stroke lengths that guarantee millions of precise load changes. Find out more!



linmot.com

**For GARDENA it is only logical to invest in sustainable automation technologies. The partnership with LinMot will therefore develop strongly. The systems are already being delivered to the plants in the Czech Republic, China, USA and Australia. This means that the special machines with LinMot components are just as globally positioned and popular as the GARDENA company itself.**

Heribert Wettels, Communications Manager of Public Relations at GARDENA

customised special systems for the respective new products,” reports the design manager. In the process, parameters and contours can change fundamentally and quickly on both the product and the machine side, so that the readjustment of the individual positions must be quick, easy and precise. “Thanks to their flexibility, the LinMot components keep up with all adjustments to the production machines at lightning speed and all changes can be made in no time at all,” says Reinhold Steck.

### **LinMot linear modules – All-in-one instead of complexity**

The highly dynamic LinMot modules DM01, SM01 and SM02 are pre-assembled units ready for installation. They represent a further development of the LinMot B and H guides that have already been in use for more than 20 years and have all the design advantages of a modern drive. Heribert Wettels: “A GARDENA unit is not an off-the-peg solution. This also means that the components that are installed in it must have a high degree of flexibility. In addition, as special machine builders, our colleagues have to deal with many different technologies. That's where the LinMots have to fit in perfectly.” A challenge that the LinMot linear modules master with flying colours: Because the DM01 modules are able to implement an infinite number of motion sequences for every customer application. With numerous strength classes, sizes and stroke lengths as well as optional, industry-specific accessories such as a completely washable motor interior for clean-in-place and sterilisation-in-place processes, stainless steel versions, fully encapsulated stator and stroke lengths of up to 2 metres, LinMot linear guides and modules are unbeatable in any production environment and machine.

The modularity of the LinMot linear modules also convinced the GARDENA engineers. On the one hand, the linear modules have the same drives as the linear rotary motors already in use, which makes the

electrical setup of the GARDENA systems much faster and more efficient. On the other hand, the numerous centring holes in the front plates and in the guide block enable fast, versatile and precise mechanical fixing of the load or other LinMot modules. "During the development phase, LinMot provided us with very intensive support," says Felix Kaifel, head of software project planning for the MDS systems. This already allowed GARDENA to investigate the various processes and determine optimal programme sequences through a test setup. And so, thanks to the kinematics function of both assembled LinMot linear modules, both the X and Y axes of the motion sequence could be realised with ground corner points. "These advantages of the LinMot linear modules enable us to move much more gently on the drive and machine and at the same time faster without jerky movements," reports project manager Kaifel.

### **Safe and effective with Safety Drives**

It is well known that high safety standards apply in industrial production in Germany. For the engineers at GARDENA, the Functional Safety offered by LinMot is therefore of particular importance. The LinMot drives with the -2S option contain an integrated, certified safety module in the same housing. In conjunction with -2S motors, this enables the implementation of safety functions such as safe limited speed (SLS) and safe operating stop (SOS). "With the -2S Safety Option from LinMot, we have not only become safer, but also more comfortable, both in troubleshooting and in commissioning the production systems," explains project manager Kaifel. For example, thanks to the high basic safety of the LinMot -2S components, the safety gates of the systems can be opened when the motor is energised in order to teach positions or to rectify faults. "Such fault clearance is not only safer, faster and more efficient, but also increases system availability. This has proven to be an

essential advantage for a quick start of production and sales for all our seasonal garden products from GARDENA," says the head of software project planning.

### **Sustainability or efficiency?**

About 15 years ago, this was indeed a decision question where sustainability ruled out efficiency or efficiency ruled out sustainability. Today, however, the cooperation between GARDENA and LinMot shows that climate-friendly industrial production and increased efficiency do not have to be mutually exclusive, but can even lead to further benefits with the right actuator technology. For the partnership between GARDENA and LinMot makes a double contribution: on the one hand, products are created that deal with natural resources in a way that is footprint-friendly, and on the other hand, new manufacturing processes are developed that help to efficiently reduce the consumption-induced water usage in industrial production. "For GARDENA it is only logical to invest in sustainable automation technologies. The partnership with LinMot will therefore develop strongly," Heribert Wettels, summarises. "The systems are already being delivered to the plants in the Czech Republic, China, USA and Australia. This means that the special machines with LinMot components are just as globally positioned and popular as the GARDENA company itself." ■■■

Linear Rotary Motor

## 38mm – a new dimension in linear rotary range

With LinMot®, slim design and full functionality are no longer contradictions. The latest example of this is the PR02-38 stroke rotary motor. With an overall width of just 38 mm, it is the most compact drive in the PR02 series, yet offers all the optional features of its larger counterparts.

### Linear rotary technology

The LinMot linear rotary motor is an actuator that combines both linear and rotary direct drive mechanisms within a single compact housing. These are individually and independently controlled by two drive controllers. Highly dynamic and freely programmable linear-rotary motion sequences can be achieved through the higher-level controller. These sequences can be executed either synchronously or independently of each other.

### Only a Swiss army knife has more features

The internal magnetic spring, integrated torque measuring shaft and force sensor provide the customer with full

functionality. The MagSpring® spring passively compensates for the weight of the moving load and also prevents the axle from lowering in a de-energised state. The torque and force sensor enables precise, repeatable and recordable closing and assembly processes.

For demanding applications and to increase flexibility, LinMot offers a further option. A hollow shaft ensures that, for example, torsion-resistant plungers, compressed air or vacuum feedthroughs can be realised in the simplest way.

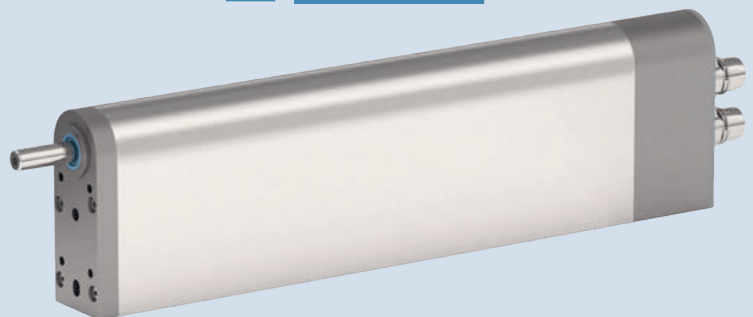
# Linear Rotary Motor PR02-38

### Applications as far as the eye can see

The compactness and hygienic design of the PR02-38 actuators open up an enormous range of applications. For example, complex movements such as screwing, closing, transferring, stacking and aligning can be achieved with a single component.

### Ready for Industry 4.0

The innovative PR02-38 provides all the necessary data packages for networked production in the sense of Industry 4.0. The drive parameters and the additional sensors that can be integrated provide detailed information such as vertical position, press or impact force, closing angle and torque. In many cases, this information simplifies or eliminates complex downstream tests or inspections. The user has full control over process quality and can detect deviations at an early stage.



# A single device for all your fieldbuses



LinMot® servo drives have been the basis for precision, dynamics and safety in the control concepts of renowned customers for 30 years. Thanks to their ultra-fast control cycle, straightforward system assembly, and the incorporation of extensive expertise in cutting-edge axis control technology developed over many years, these systems can effectively address the expanding

# Multi Interface Drive

range of needs across various global industrial mechanical engineering sectors. As the market leader in the field of tubular servo motors, LinMot recognises and implements all

customer requirements and presents the Multi Interface Drive to you.

## The language talent of industrial communication

As the name suggests, this flexible servo drive functions as standard hardware for all common fieldbuses. Thank to this feature, all MI drives offer a technically homogeneous unit concept despite a heterogeneous fieldbus landscape, which can protect the communication between machine parts and PLCs from possible incompatibilities and cost burdens. In addition, the resource-saving reduction of physical components of the new Multi Interface Drive results in simplified and at the same time more flexible implementation options as well as time and cost savings thanks to simpler stock-keeping and better availability.

## The latest communication platform for Industry 4.0

With 50 different fieldbus now available, the industrial communication of complete systems is at the mercy of error-prone hardware and software solutions. The LinMot Multi Interface Drive offers a consistent control concept that combines both an Industry 4.0-optimised application

design and the possibility of data exchange in real time as well as guaranteed compatibility with new standards and future networks, such as TSN and PROFINET High-Performance Profile, in a single device.

## A single device for all your fieldbuses

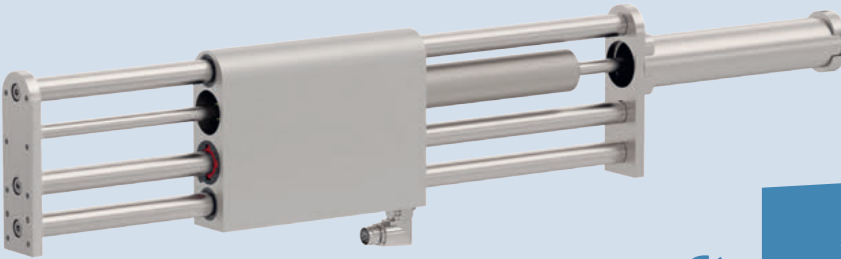
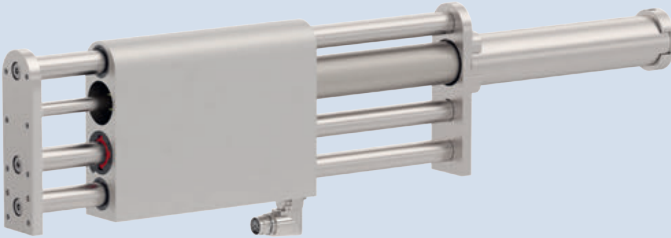
The diversity of communication protocols often shapes industrial data exchange through incompatibilities. As a solution, LinMot Multi Interface Drives ensure the interoperability of your systems and offer all relevant fieldbuses in one device.

## Your advantages with our Multi Interface Drive

- Lower costs
- Uniform hardware
- Overall compatibility
- Better availability
- as well as**
- Quick and easy reconfiguration for all MI drives
- More cost-efficient and sustainable despite increased functionality
- Equipped for the future and ready for Industry 4.0
- Fast product introduction with new or additional fieldbus
- All new C12xx drives are developed as MI variants

Linear Module DM03

**On the axle,  
ready, up**



Winning the race against time is not just the ambition of endurance athletes or sprinters. Mechanical and plant engineers also face this challenge. Here, however, the aim is to achieve the shortest possible cycle times for linear movements. How do you make labelling processes for packages of various sizes as fast and reliable as

possible? Particularly, how do you achieve this in vertical applications where the weight of the axis and the attached load constantly impact the process? LinMot addressed this challenge more than 20 years ago with the revolutionary “magnetic spring” MagSpring®. Installed parallel to the linear motor, the MagSpring acts as an intelligent

**Linear Module**

**DM03**

counterbalance to the weight of the axis. The MagSpring not only provides constant load relief, thus saving energy during operation, but also ensures that the position of the linear motor does not change by itself in the event of a fault, or that the motor automatically moves to a park position when it is switched off. It is only logical that the proven MagSpring has found its way into the new DM03 linear modules. As a significantly reinforced variant, it makes its contribution for use in demanding vertical applications.

## The slim glutton

The newly designed DM03 linear modules are packed with technology and features, yet remain incredibly slim. This drive solution combines the MagSpring mentioned above with a linear guide and a powerful linear motor of the type PS01-23, PS01-37 or PS01-48. A force sensor and a high-precision absolute-position sensor (BiSS) can also be integrated as options. If you think that the drives cannot be built compactly in series, think again. Thanks to the slim

design and the rear-mounted motor connectors, the overall width of the largest DM03 linear module (DM03-48) is only 50 mm.

## Lifting motion in record time

Thanks to a clever move by LinMot engineers to place the MagSpring inside the DM03 linear module, the user benefits from a newly designed magnetic spring that is significantly stronger than its predecessors. The MagSpring, which acts as a passive counterbalance for the weight, now generates a holding force that is three times greater. As a result, the power consumption of the electric drive can be reduced and the acceleration of the axis significantly increased. This advantage was demonstrated in a labelling application. The vertical axis

used here moves a mass of 0.5 kg and, thanks to its stroke of almost 700 mm, can apply a label to various package sizes and even envelopes. The entire stroke is completed in a record time of 300 ms!

## DM03 linear module vs. pneumatic cylinder

It is easy to compare the two technologies, since the DM03 is often used for point-to-point movements with two end positions. But what about one of the most important criteria when comparing drives – energy consumption? Here the DM03 comes out on top. This is due to the high efficiency of electric systems and the comparatively low efficiency of pneumatic drives. Compressors can only convert a small proportion of the energy they consume into useful power – the much larger proportion is lost as heat. A closer look at the process reveals another advantage of linear modules. It is only during the acceleration phase that the module does any real work. When the motor is at a standstill, the MagSpring supports

the work, and when the motor is moving at a constant speed, it does not consume any power, except to compensate for friction. The kinetic energy generated during braking is converted into electrical energy in the motor (generator effect) and stored in the DC link capacitors of the servo drive, where it can be used for the next cycle.

If we make a concrete comparison between the two types of drive, the effects just described demonstrate significantly greater potential for savings in favour of the electric linear modules. If we take the labelling application example above and assume a cycle time of 1 sec with a load mass of 0.5 kg, the energy cost savings of the DM03-37 compared to a similar pneumatic cylinder amounts to a whopping 5500 euros per year! ■■■

# Get your circulation going



**Transition in  
Packaging –  
Turnaround with  
LinMot?**

## The solution

Yes! This is why the machine builders from Saxony trust only the finest in terms of power, adaptability, and sustainability, and use the complete drive solution DM01 from LinMot in their new KKA carton erector system.



**FOR A CLIMATE-FRIENDLY REVOLUTION IN THE PACKAGING INDUSTRY.** The issue of sustainability must start at the engineering stage, with sustainable machines. This is where the partnership between KRÖNING and LinMot comes in. **TEXT MIHALY VIDOVENECZ**

Everyone is talking about the need for a fair and ecological recycling economy. In recent years, sustainability strategies have set a common goal of defining new standard criteria to meet this need, intended to bring about a climate-friendly turnaround in the packaging industry. But there are still a few pieces missing from the puzzle of holistic, resource-friendly operations. To fill in the gaps in this ecological industrial design model, the partnership between [...] and [...] is based on a future-oriented idea: sustainability efforts must begin with the engineering of machinery for sustainable production. This is why the machine builders from Saxony trust only the finest in terms of power, adaptability, and sustainability, and use the complete drive solution from LinMot [...] in their new KKA carton erector system.

### **Rethinking ecological industrial design**

The appearance and sustainability of a product are often factors in the critical impulse to make a purchase. Consumers are increasingly moving away from the “take, make, throw away” mindset and turning to products that are sustainably under the new consumer protection directives 2005/29/EC and 2011/83/EU. Their preference is for producers who have ecologically, economically,

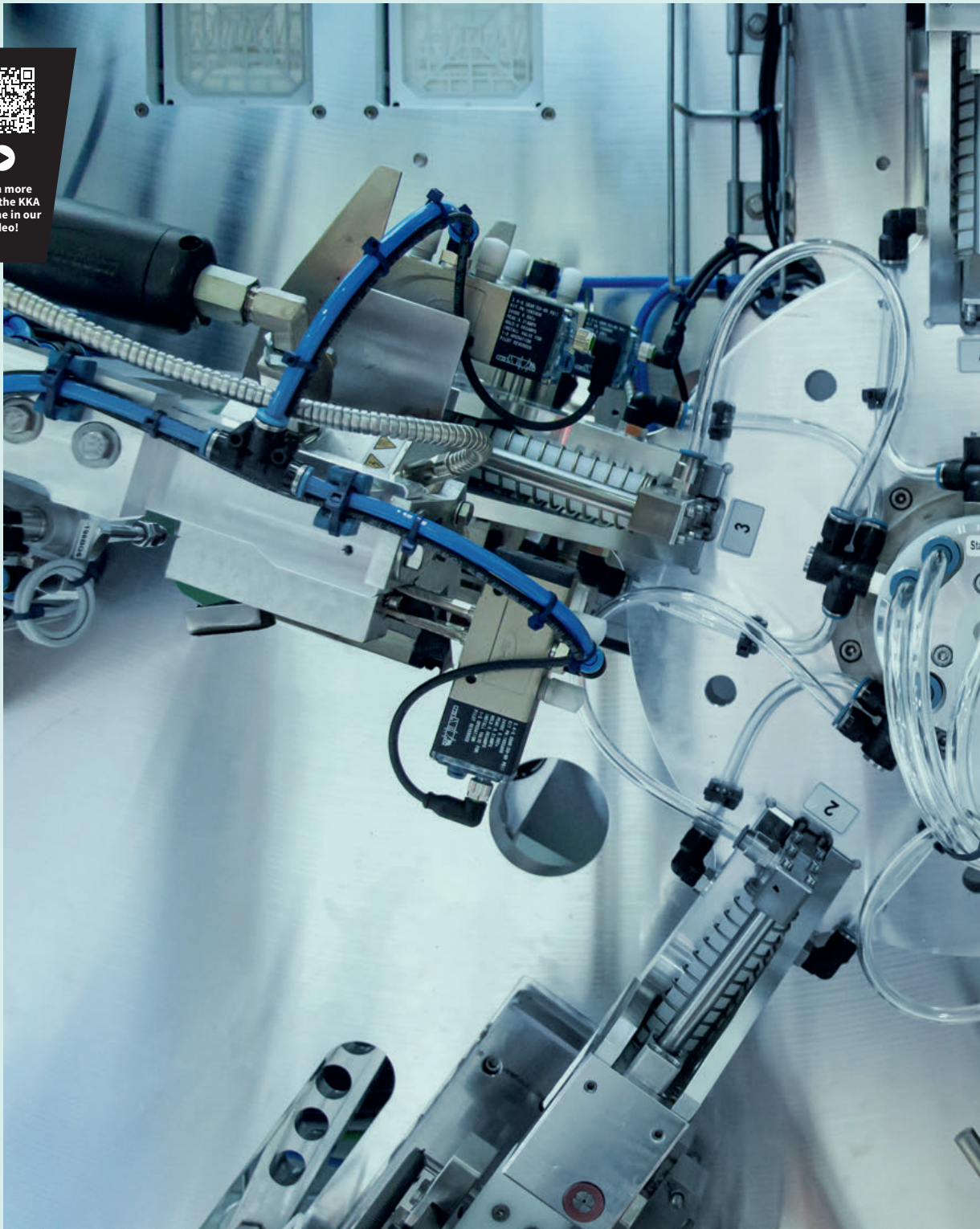
and socially sustainable production environments. This rise in the significance of environmentally friendly product design is also important to many decision-makers: “For the majority of company representatives, packaging is an important area of investment (51%). The question of whether the business would benefit from an investment in better packaging was answered positively by nearly three-quarters of those surveyed. In response to the question of whether investments in packaging would help efforts in the area of sustainability, positive responses came from 80% of participants,” reports a current survey. “Stefano Rossi, CEO of DS Smith Packaging, commented: Consumers want less packaging. As raw materials are more expensive than ever and the environmental benefits are substantial, customized packaging (...) is more important than ever.” The advance of individualized product variety and the upheaval in industrial policies needs to extend to machine technology in the packaging industry. This could certainly be the credo of custom machine builder KRÖNING, whose automated systems combine the latest scientific insights of the Fraunhofer Institute and the Technical University of Dresden with sustainable and powerful linear drive solutions from LinMot.

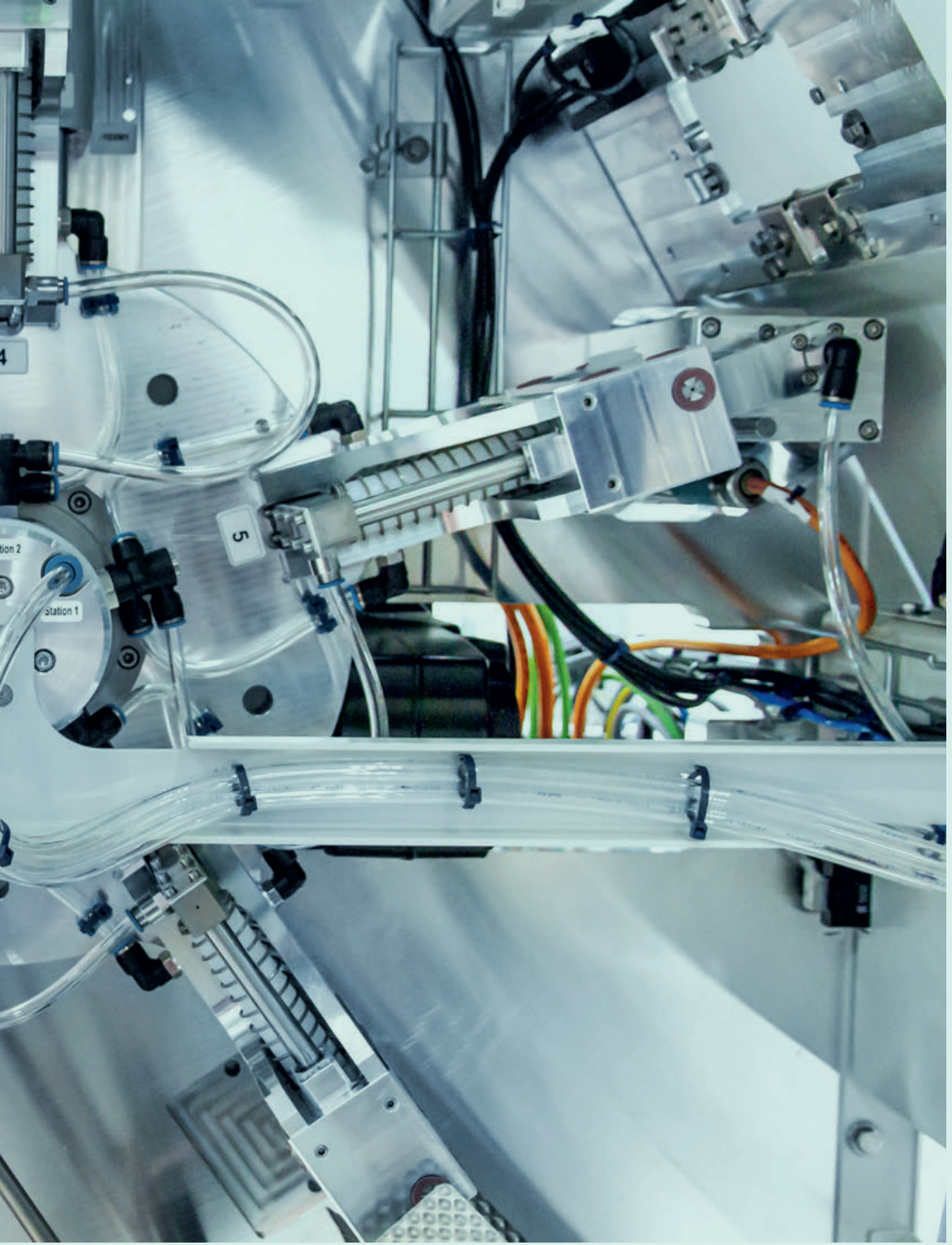
### **Design freedom with LinMot solutions**

“When we started working together with LinMot, we found the [...] short motors to be especially appealing,” recalls Christian Wölle, design manager at KRÖNING. He praised the practical flanged construction of these →



Learn more  
about the KKA  
machine in our  
video!



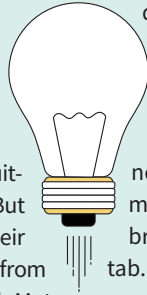


High-performance, compact, and eminently versatile: The KKA carton erector from KRÖNING Automation is an exceptionally flexible system. With two high-efficiency LinMot DM01 guides, its high speeds and space-saving, certified hygienic design work in any field of application.

**LinMot has become a standard supplier for us. Our new machine, which will be equipped with more than 30 LinMot actuators, is proof of this.**

Christian Wölle, Design Manager KRÖNING - Automation

short drives, which is exceptionally suitable for their specialized machinery. But the benefits extend to more than just their specialty packaging lines, as is evident from the unusually diverse industries of LinMot customers. Systems for handling, filling, inspection, feeding, assembly, stacking, sorting, and diverting can take advantage of the open position of the outgoing cable on the P01 series, as well as the compact and robust designs of the entire LinMot product range. Every industrial field can use them for optimal designs of sustainable machinery concepts with a small footprint and less dead space. The space-saving, dynamic properties of the iron-free synchronous servomotors and their guide units were critical for a newly developed product from the specialized machine builder in Saxony. The KRÖNING carton erector "KKA" replaces an obsolete unit that used various cam discs and mechanical linkages with the compact design of a central drum cam turntable. The KKA, with a throughput rate of up to 95 cartons per minute, compact



dimensions (1.7 × 1.1 × 1.9m), and a relatively low weight of 1600 kg for the base model, can match the speed of a large system with the footprint of a mobile solution. The modular principle of the newly developed LinMot linear modules played a critical role: "At the beginning of 2019, we were working with the motors only, and were still building the guides ourselves. We were very glad to see the new [...] which gave us a lot of freedom in terms of modularity when the carton erector was first created," says Mr. Wölle, confirming the great technical design adaptability of LinMot linear guides, which are used in two particularly technically challenging steps in the system.

### **DM01 Linear Module – total package eliminates complexity**

In the first step performed by the KKA, the decorative tab (the insert that is inside the carton) is rotationally placed on the head by a servomotor. This head has various suction points that are moved to the carton pre-cut in the next step by a clean-room certified DM01 module, which suctions the pre-cut and brings it together with the decorative tab. "The machine motions and the dynamics they require could also be realized by pneumatic cylinders, but only with a large number of different attachments," explains Mr. Wölle, underscoring one of the most significant benefits of LinMot linear guides. The FDA-conforming, highly dynamic DM01 modules are pre-assembled units that are ready to install, with all of the design advantages of a modern drive package. Of particular note among these design advantages is the compact design of the LinMot guide units, which greatly simplifies and speeds up their integration in production machinery of all kinds, in any industry. In addition, both the load and the module can be installed easily, but still precisely, using the numerous centering holes on the front plate and the guide block. Hardened, chrome-plated guide shafts and low-maintenance, easy-to-clean guide blocks and covers made of aluminum

The game-changer of packaging: equipped with systems from global leading brands and with LinMot DM01 linear modules, which are available in over 60 variants, the carton erector from KRÖNING is a dynamic, hygienic, and sustainable hub of future-oriented and progressive technologies.

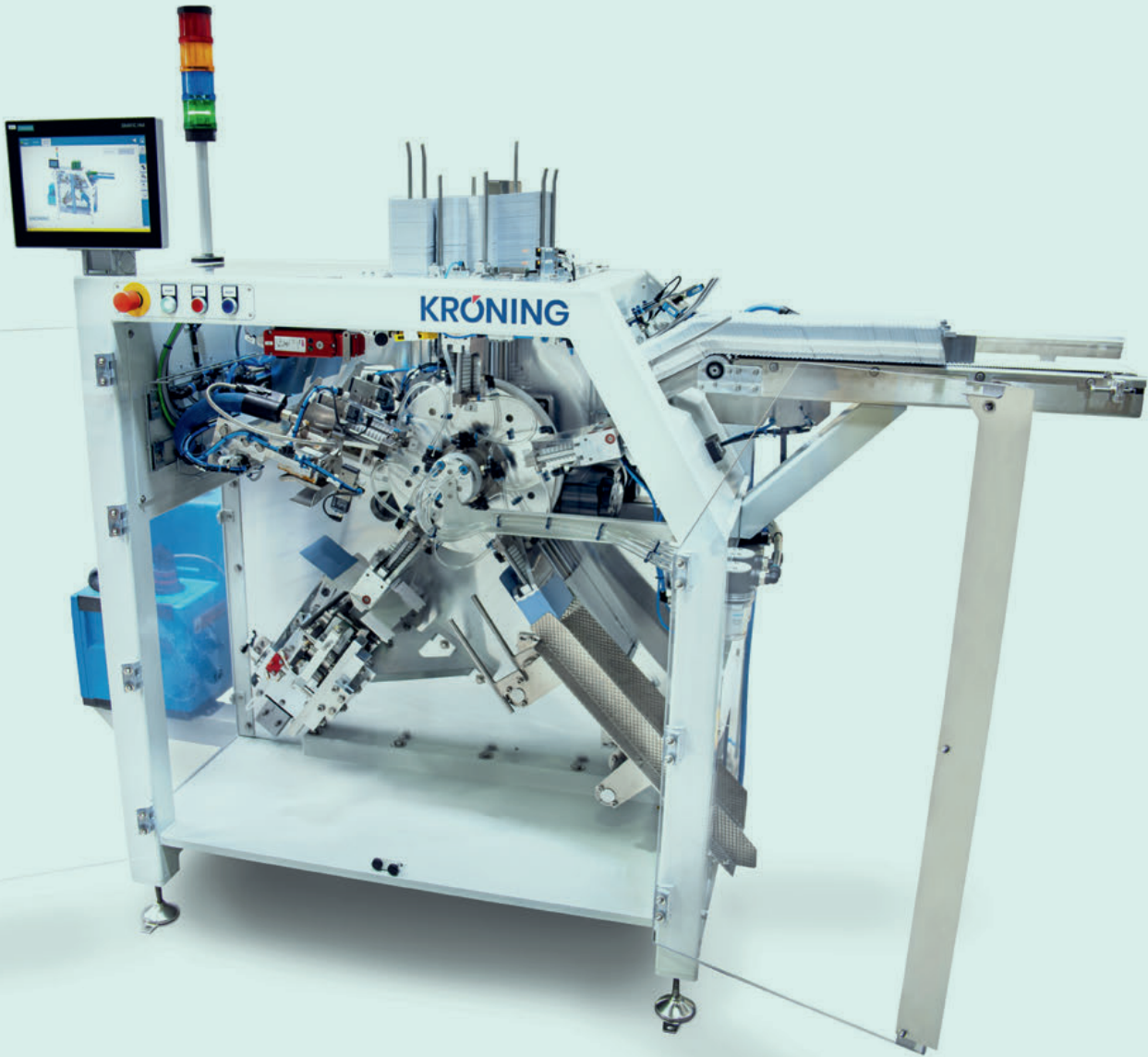


Photo: KRÖNING – Automation



provide strong support against lateral forces and flexural rigidity.

In the next step, glue is applied to the tabs. The following step uses the folding box, which is moved by a slider crank system, to fold the pre-cut around the head. In the next and final process step, the linkage moves toward the discharge chute and the carton is pushed off of the head by the second LinMot DM01 module. This step sounds simple, but it can be realized only with tools of exceptional flexibility. The particular challenge of specialty machine building is that every system is its own engineering experiment, and its success depends largely on the performance range of the functional building blocks that are used. "As a specialty machine builder, our requirements for third-party systems are very specific, and the implementation of a classified push-off procedure is no exception. Thanks to LinMot programmable electric actuators, however, we have great freedom in terms of the end position, speed, and acceleration, which can be varied along the entire stroke length," reports the KRÖNING design manager. In order to be able to meet these kinds of specific, increasing requirements, LinMot provides several series of linear systems that are ready to install and capable of innumerable motion sequences for whatever the customer application needs. With numerous strength classes, sizes, and stroke length, as well as optional accessories developed for specific industries, such as a completely washable motor interior for clean-in-place and sterilization-in-place processes, 1.4404 (AISI 316L) stainless steel models, fully encapsulated stator, and stroke lengths of up to 2 meters, LinMot linear guides are unbeatable in any production environment.

### Force sensor modules

"We were impressed by the LinMot applications that we saw at other machine builders and the exhibition units at trade shows, and we think that this company has nowhere near reached its limits," says Mr. Wölle,

underscoring his confidence and satisfaction while indicating the new developments at LinMot. One of these is the force sensor module for the linear guide series DM01-37 and DM01-48, which can be installed as a front flange directly on these modules. Thanks to the design concept of the LinMot DM01-37-FSxx and DM01-48-FSxx force sensors, a number of critical advantages over conventional force transducers are available to machine builders:

→ **Not sensitive to lateral forces:** the design of the force sensor module provides effective compensation for lateral loads and suboptimal force application.

→ **High measurement accuracy:** even if the force is applied axially off center, special bearings enable the calibrated force sensor to provide the correct measurement result.

→ **Zero point calibration:** devices with external weight loads, such as grippers or punches, can be installed without affecting the measurement results.

→ **Position and force control:** together with the C1250 drive, which is also calibrated, it is possible to realize a process either with force control or with process monitoring based on the forces that arise.

"A LinMot is always a nice package," says Mr. Wölle, summarizing his thoughts about the solutions available from LinMot. The young design manager from KRÖNING concludes with a look to the future, which looks bright with the promise of further cooperation between the two companies. "LinMot has become one of our standard suppliers. This is attested to by our new machine, in the conception phase right now, which will be equipped with over 30 LinMot actuators." ■

Reliable tool for a perfect landing. The parameterized DM01 module from LinMot (rear) pushes with millimeter precision to position the boxes precisely when they arrive on the conveyor belt. "This would be hard to imagine with pneumatics," says Mr. Wölle, mechanical design manager.

The LinMot TM01 Technology Module

## The simplest solution for standard mechatronic tasks

Manufacturers of machines and production plants frequently encounter the need to implement mechatronic standard tasks, which demands a substantial investment of time and effort. These efforts, starting with the search for a suitable solution, the compilation of individual components from a wide range of manufacturers, through procurement to complex programming, are significant cost drivers. In addition, there is a latent technical and time risk in getting the required task up and running by the planned deadline.

To alleviate the need for reinventing the wheel with every task, LinMot will in future offer you comprehensive mechatronic packages for many standard tasks. These will enable you to implement standard mechatronic tasks at any time, without major risks, at the budgeted cost and on the desired date.

The key to the comprehensive mechatronic package is the

well-known LinMot modular drive system together with the new TM01 technology module.

### The LinMot TM01 technology module

is a multi-core real-time tool from LinMot, in which LinMot makes available its decades of know-how in process automation. With the technology module, the following standard mechatronic tasks with error handling, data storage and simple process monitoring and evaluation including predictive maintenance can be offered in a single device in the future:

- Closing/Capping
- Force control
- Handling
- Screwing
- Press-fitting
- Assembling
- Thread testing
- Process monitoring
- Dispensing

In this way, the pre-programmed and expandable technology module offers you the option of outsourcing

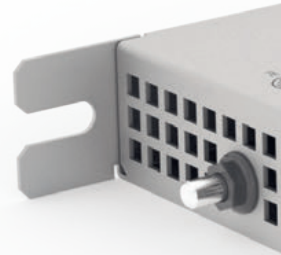
dynamic processes and functions in closed blocks from the control system and thus making resources available for individual tasks.

### In line with the process

The standard solutions offered by LinMot or your own applications and functions can be parameterised and called up in the TM01 technology module. The LinMot technology module offers advantages in all areas of application thanks to its modular design and the wide range of options for connecting peripherals. In the future, vision applications can be easily integrated and used for process evaluation by combining motor information and image monitoring. Results, motion curves and live images can be displayed directly on multiple monitors or stored on a web server. The technology module itself can also be used as a data server for the connected LinMot drives, e.g. for loading a configuration or the entire firm are.

### Perfect for single- and multiple-axis solutions

The TM01 technology module is the ideal solution for controlling and monitoring



linear axes and when multiple actuators – as the linear and rotary axes in linear rotary motors, DM01 modules in pick-and-place units or FM01/EM01 modules in gantry systems – need to communicate or synchronise with each other.

### Time-saving, cost-effective, fast

Are you facing a lack of time, experience or manpower? Then the LinMot technology module is the ideal solution. Use our solutions for standard mechatronic tasks and benefit from 30 years of LinMot know-how.

### See the features

**Camera:** It is also possible to connect a camera directly for classic or AI image processing. This makes it possible, for example, to visually record an assembly process and use this, along with other data, for process analysis and storage, for example on an OPC UA server.

**Provisioning server:** The LinMot technology module



# Technology Module TM01



## Technical specifications

- 2× HDMI
- 3× USB 3.2 Gen1
- 2× RJ45 Gigabit ETH
- 4-core 1.5 GHz system
- Based on Unix and CODESYS
- Powerful multi-core real-time system
- Modular design with a wide range of interfaces

is ideally suited as a configuration memory for various drives. Configurations can be downloaded and updated at the touch of a button. Firmware updates are also possible in this way.

**Web visualisation:** Thanks to the connectivity of the LinMot TM01, results, motion curves, live images and other process monitoring details can be displayed directly on a web server or on multiple monitors using remote and local browsers.

**Remote maintenance:** Without sacrificing the security of the RMM, you can control and monitor the LinMot technology module with your favourite remote access tool.

**Data aggregation:** With data storage and retrieval via OPC UA or SQL Server connectivity, your automation systems are ideally equipped to collect, transfer, analyse and evaluate processes – ready for predictive maintenance. ■

Functional Safety

## Hands protection

Opening the safety gate and quickly readjusting a position or correcting a fault sounds pretty trivial. And it's true, it is trivial. But only as long as the drives in a production plant have the appropriate safety functions. Thanks to the high basic safety of the LinMot 2S drive systems, such interventions in the plant are possible without any problems when the power is on. Although plant availability is an important factor everywhere, it is even more important for seasonal products such as irrigation products, as is the case at GARDENA. "With the 2S safety option from LinMot, we are not only safer, but it is also more convenient when troubleshooting and commissioning the production systems," explains GARDENA project manager Felix Kaifel, who was recently interviewed.

### Safety functions in the drive control

Like Mr Kaifel, many other LinMot customers are pleased to

# Functional Safety C1251-2S



be able to use the C1250 series of servo drive as a 2S variant. They particularly appreciate the fact that the dimensions of the motors have not changed compared to the standard version. No additional hardware is required as all safety monitoring is integrated into the drive itself. In addition to STO (Safe Stop) and SS1, which were already available on the 1S version, the drives now offer Safe Stop 2 (SS2), Safe Operation Stop (SOS), Safe Limited Speed (SLS) and Safe Brake Control (SBC/SBT). The Safe Brake Control (SBC) has been extended to include a Brake Test (SBT), which allows the braking effect to be checked cyclically.

### Safety encoder in the linear motor

Like the drive controller, the linear motors themselves are designed for functional safety, so the three most commonly used sizes are offered with safe encoders. Externally, the 2S motors (stators and sliders) are identical. They do not require an additional sensor and are connected to the drive using the familiar single-cable solution for safe drive control.

### We speak one language

Safe, fast and reliable communication between the PLC and the individual drives is essential for a functioning safety concept in the machine. The new 2S servo drives therefore communicate with the higher-level control system

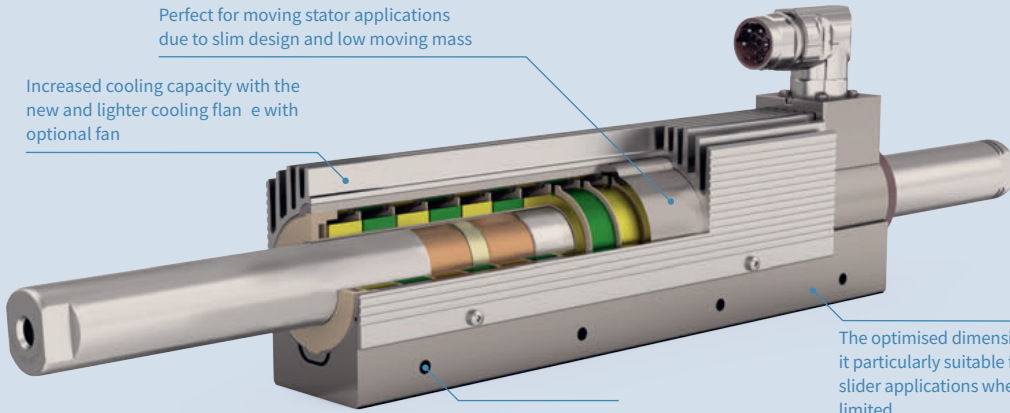
via various safety bus systems as required. The user can use PROFIsafe via PROFINET and PROFIdrive or transfer protocols via EtherCAT (FSofE), EtherNET IP (CIP Safety), POWERLINK and sercos. Alternatively, the safety functions can be activated via the integrated digital inputs.

### Tested safety

At a very early stage in the development of the "Safety" products, LinMot brought the globally active, independent certification company TÜV Nord on board. The company supported the product concept with testing services during development and methods for risk minimisation in accordance with the generic standard IEC/DIN EN 61508. The result of this collaboration is the certified compliance of 2S products with all relevant safety standards. ■

Perfect for moving stator applications  
due to slim design and low moving mass

Increased cooling capacity with the  
new and lighter cooling flange with  
optional fan



The optimised dimensions make  
it particularly suitable for moving  
slider applications where space is  
limited

Mounting flange with  
optimum thermal  
coupling to the  
machine chassis

P01-48-M01 with Integrated  
Mounting Flange

## A favourite product of LinMot customers became even better

### Newer

A particularly important part of the LinMot DNA is the continuous development. This characteristic, coupled with close communication with customers, once again made it possible to meet specific user requirements. After the linear motors P01-23, P01-37 and P01-48 have already been available as “high-performance” variants for a longer period of time, LinMot is now launching the size 48 in an even more optimised version.

### Stronger

The already proven modifications to the motor winding, the magnetic circuit and the use of high-performance materials ensure the increased

performance of these motors. The optimised performance is particularly evident in the parameters of peak and continuous force as well as speed. These advantages can now be used even more flexibly: since the design of the new M01 variant is based on the proven short motors P01-23S and P01-37S, the size 48 motors now also offer optimised dimensions for confined spaces.

### Thinner

So if you opt for the M01 family, you will benefit not only from the higher power density

# Linear Motor P01-48-M01

but also from the practical dimensions and the extended possibilities for mounting. This is ensured by the integrated mounting flange of the 48 series: it scores with both a particularly slim design and M8 threaded holes on the right and left sides as well as on the underside.

### Cooler

Even applications in the smallest installation space, which were previously difficult to implement or required forced cooling, can be realised with the new M01 linear motors. This is possible because the cooling capacity can be increased by the new, lightweight cooling flange without disturbing additional space requirements. The motors of the M01 series thus have a slim cross-section as well as a low moving mass and are particularly suitable for both moving slider and moving stator applications. ■

# FACTS & NUMBERS



# LinMot in Las Vegas

Breakthroughs and innovation power PACK EXPO Las Vegas 2023. PACK EXPO Las Vegas brought together nearly 2,200 exhibitors and over 30,000 attendees from more than 40 market sectors, making it the most comprehensive packaging and processing show of the year in North America.



For LinMot, PACK EXPO was a success! Thanks again to everyone who visited us at the show. It was great to see everyone in person and to show all the LinMot innovations. See you at the next show!

## **LinMot National Sales Conference in Las Vegas**

Beginning with our outdoor welcome reception in front of the Las Vegas skyline on the evening of 13 September and ending with a Las Vegas-style Oktoberfest at the Hofbrauhaus

on the evening of 15 September, the National Sales Conference was a resounding success. The immersive two-day experience showcased new innovative

LinMot technology, the latest advances in Sales Rep applications, and featured guest speakers with expertise in Sales Rep business development. ■



# Aaaand action!

Our social media channels are also becoming increasingly active. Check out our top 3 posts on YouTube!



Linear motors  
as the future  
of industrial  
automation



GARDENA pro-  
duction more  
precise than  
ever thanks  
to LinMot



Highspeed  
performance  
with LinMot  
linear motors

Folgen Sie uns:



# Would you like to know even more about us?

To find out more about us, check out our posts on LinkedIn!



The new LinMot research and development centre



The PR02 linear rotary motor is product of the year 2023



Energy saving and environmentally friendly production with LinMot



Folgen Sie uns:

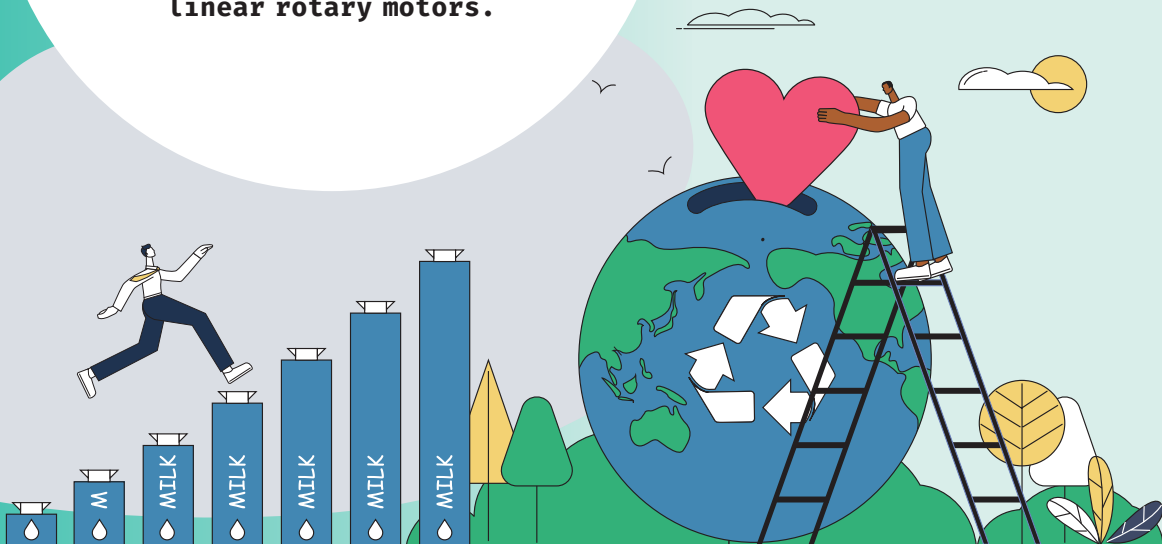


# Please do not spill

## The solution

With Wing-Cap closures from Emmi, which are closed with the LinMot linear rotary motors.

How can I avoid spilling milk when opening the carton pack?





## 200 million litres of milk and 60 million litres of cream.

These impressive quantities of liquid are processed each year at Emmi's Mittelland Molkerei AG in Suhr. Right in the middle of it all: LinMot's linear rotary motors and wing-cap closures.

TEXT ANDREAS DELLA CASA

“Customer convenience” is Hans-Peter Steuri's succinct answer to the question of what prompted Emmi to use the wing-cap closure. The project manager in Suhr then takes us on a brief journey through the history of Swiss packaging. “Originally, Tetra Pak packaging was rectangular, like a brick. In the 90s, this packaging was then replaced by the tubular bag”. But this extremely economic and ecological packaging also had its drawbacks: The bag was too prone to tearing and could not be resealed. This was followed by a return to conventional packaging, but this time with a glued-on screw cap. With this, an aluminium layer had to be torn off the inside of the cap with a plastic ring after the first opening. This solution was a feat of strength, and the jerky removal of the aluminium layer often resulted in liquid spillage. In order to offer customers the best possible packaging, Emmi was looking for a solution that could be resealed and opened easily and without effort. It was also important that the drink could be poured without spilling. The answer to these requirements: a wing cap.

### Reliable, accurate and fast

The highlight of the wing-cap closure is that the sealing disc is directly connected to the cap after closing, so that it opens easily and effortlessly when the wing cap is opened for the first time. Precise twisting of the wing-cap closure is crucial for an efficient and reliable closing process. This is why the

The cap with the “wings”. Wing-cap closures, which are closed using LinMot lifting rotary motors, also stand out visually from the crowd.



renowned machine manufacturer Tetra Pak relies on lineal rotary motors from LinMot.

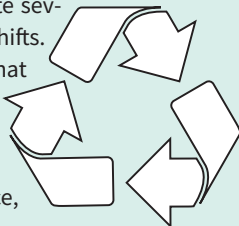
The carton packs that have already been filled are transported on a conveyor belt to the Tetra Pak sealing machine. Here, a wing-cap closure is first placed on the pack. The precise sealing of the lid is then performed by a LinMot PRO1series linear →

rotary motor, which combines two electromagnetic servo motors – a linear motor and a rotary motor – in one housing. Thanks to its innovative mechanical design, this ready-to-install machine element is able to realise combined linear and rotary movements in the simplest way and, for example, screw caps freely according to customer requirements. In Emmi's case, the lid has to be closed as follows: rotated at an angle of 90°, with the two "wings" aligned on a horizontal line. During the closing process, the LinMot linear rotary motors not only ensure that the lid is rotated onto the thread gently and without damage, they also find the correct start of the thread and, by combining linear and rotary motion, ensure that parameters such as linear position, angle of rotation, force and torque are always maintained throughout the process. This means that there is nothing in the way of a fully monitored assembling, as is often required in connection with Industry 4.0 requirements. Once the screw has been correctly assembled, the sealing coil performs the final operation.

The whole process takes just 3 seconds and is carried out in parallel by two stations simultaneously. Once a week, production is switched from 1-litre cartons to 0.5-litre cartons. The format changeover required for this is carried out in a fraction of a second with the LinMot linear actuators by simple parameterisation of the motion profiles and can be carried out directly by the PLC.

### **Innovation that pays off**

The machine developed by Tetra Pak has been in use at Emmi for three years. During this time, the LinMot linear rotary motors have not failed once, despite seven-day production in three shifts. Regular maintenance is all that is needed to maintain a durable and economical production machine. Based on this positive experience,



**Precise twisting of the wing-cap closure is crucial for an efficient and reliable closing process. This is why the renowned machine manufacturer Tetra Pak relies on linear rotary motors from LinMot.**

Emmi has been operating another production line with an identical capper since March 2021.

### **More sustainability for the future**

When asked what innovations he would like to see in the future, Hans-Peter Steuri sees even more potential in one area in particular: sustainability. "We have already achieved a lot in this area, but perhaps we can save even more material." Ultimately, the goal is for consumers to close the recycling loop properly. This is already possible with Tetra Pak packaging. In Switzerland, there are around 100 collection points where beverage cartons can be returned. Future packaging will be even easier to recycle. Not just in Switzerland, but worldwide. And as soon as the requirements profile for the packaging of the future is clear, LinMot linear and linear rotary motors will be ready to go. ■

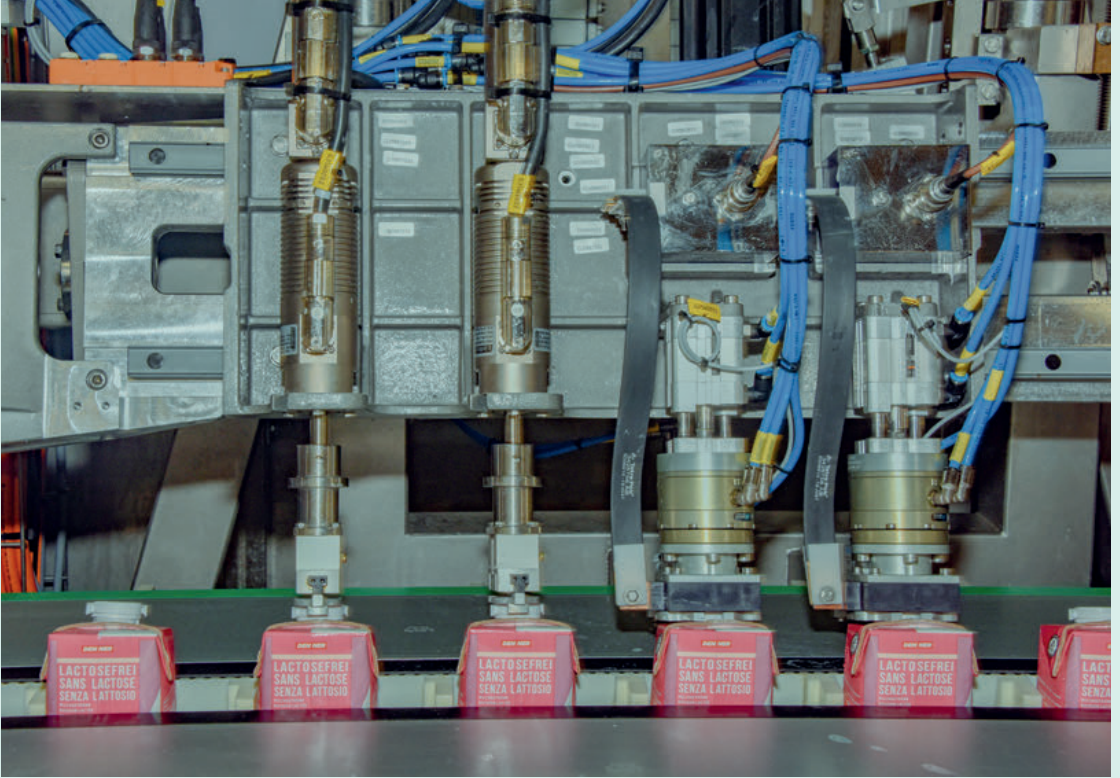


[linmot.com](http://linmot.com)

#### **THE CLOU BEHIND THE CLOSURE**

### **LinMot linear rotary motors**

A LinMot linear motor and a rotary torque motor are the central drive elements in the PR01 series of linear rotary motors. The slim design enables installation in the smallest possible footprint. Other options such as a MagSpring for load compensation or a pneumatic brake can be added to the module. Find out more!



The entire process at a glance. From setting the closures to positioning and sealing.



Gripper Module GM01

## we GRIP it

Gripping, positioning, stacking, aligning or centring:

The new LinMot GM01 series gripper module is designed for precise gripping and moving of products in the most demanding environments.

### **Innovation to the point**

With the high flexibility and adaptability of the new gripper module, LinMot is once again one step ahead. How so? The special arrangement of the gripper's two durable tubular linear motors allows each jaw to be controlled independently. This means that the GM01 can not only gently grip and transport dry, moist,

hard or soft products without leaving visible marks, but can also move them axially to the left and right of the gripper. This makes it possible to use special gripping tactics (e.g. the shovel-broom principle) that cannot be achieved with a conventional gripper. In addition, the LinMot GM01 is easy to clean and its hygienic design and high IP69 protection rating make it ideal for use in the food industry. Thanks to the position detection of the gripper and the control of the clamping force, even products with a non-uniform shape can be gripped safely. One of the key benefits of the GM01 series of intelligent grippers is the wide

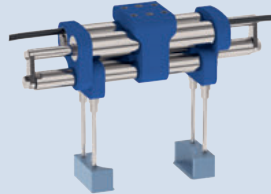
range of monitoring options that are essential for applications with a high degree of automation. This means that faulty gripping or even faulty parts can be detected and sorted out “on the fly”.

## Any product shape in any environment

The dynamic and flexible characteristics of the LinMot linear motors integrated in the gripper make it possible to grip countless product shapes. To meet even more individual process requirements, the gripper jaws can also be customised by the customer and adapted exactly to the characteristics and shape of the product. Thanks to the flexibility of the LinMot GM01, each gripper unit can be adjusted and moved as required, both in terms of force and position, despite the customised design of the gripper jaws. Whether it is round products with a delicate surface, the collation of several products according to the “shovel-broom principle” or large and flat products with a sticky surface, the LinMot gripper

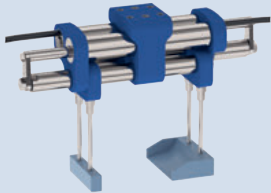
modules offer a flexible, adaptable solution that is optimally matched to the product characteristics.

### Round products with a sensitive surface



The gripper closes until the product is gripped or lightly touched. It is possible to check that the product – no matter its size – has been gripped correctly. To prevent slipping, the contact pressure can be increased (depending on the transport dynamics). The product can be set down by slowly or quickly opening one or both gripper jaws. With the measurement, control and storage of information such as position, force and even temperature, process steps are 100% verifiable and traceable.

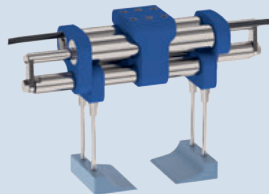
### Collect several products at the same time using the shovel-broom principle



The gripper (left) pushes the product onto the shovel (right). The shovel is placed in

front of the product and then the broom gently pushes the product into the shovel. This also allows multiple items to be loaded. By applying slight pressure during transport, the broom can prevent the product from falling out. Unloading is done with a quick jerk to remove the products from the shovel and place them in a defined location.

### Large and/or flat products with a sticky or adhesive surface



To gently lift sticky and adhesive products, such as a chicken breast, from the surface, the gripper jaws are gently moved under the object to be gripped. Just before the product is placed, the gripper is opened halfway. This allows the product to adhere to the substrate before the gripper jaws are fully separated for precise and gentle placement.

### Combination with our SM01 stainless steel guides



The GM01 gripper module adds a further element to the LinMot stainless steel line by means of simple coupling and material standardisation. Together with the SM01 guide, a complete pick-and-place application in stainless steel EN 1.4404 can be constructed: the two linear modules SM01 realise movements in X and Z direction, while the GM01 can additionally move the gripped product in Y direction. A complete LinMot solution, distinguished by its remarkable resistance to chemical influences and an exceptional service life, even even when faced with challenging conditions. ■

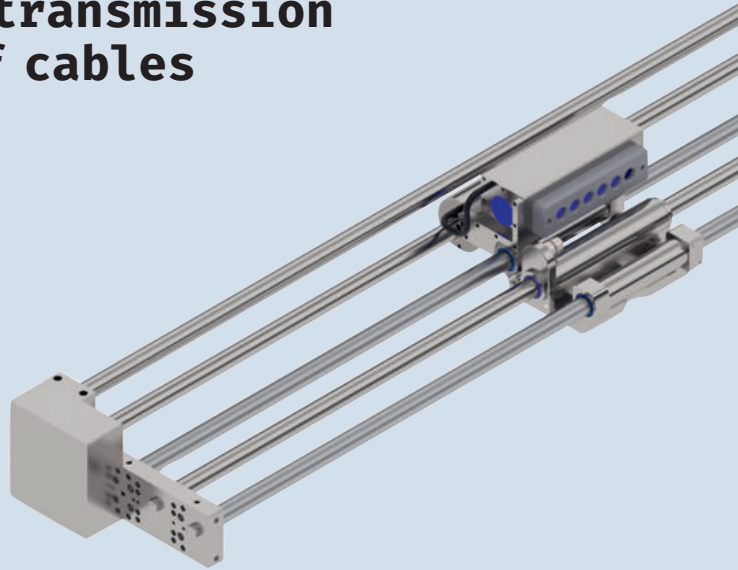
Transformer Track

## Industrial power transmission without the use of cables

### Why cleaning processes in food and pharmaceutical plants still take too long

By their very nature, cleaning processes play a central role in the food and pharmaceutical industries. Until the 1950s, process equipment had to be dismantled and cleaned manually. This process usually took a long time. Only through the subsequent introduction of “Clean-in-Place” processes, in which a defined cleaning programme is executed almost fully automatically in a closed system, was it possible to reduce the effort involved. Since then, systems have become increasingly productive and cover a wider range of tasks. This means that linear drives have to generate larger strokes for pick-and-place tasks, for example. At the same time, the amount of cabling and cleaning required increases. To reduce these factors, LinMot has been working for some time on an innovative approach to power transmission.

# TRANSFORMER TRACK



### When does cabling become a problem?

Sorting, cutting, portioning and loading fish fillets. Modern fish processing plants perform these tasks quickly and efficiently. But after processing, there is an equally important part of the process. Cleaning. Typically, each processing area in a plant is hosed down with aggressive chemicals in several passes under pressure. Look inside a fish portioning machine, for example, and it's no surprise that you'll find a lot of stainless steel, plastic and rounded shapes. Everything has to be washable and food-safe. However, one



part of the design does seem a little clumsy. Each sorter unit has at least one cable and a cable guide. With typically 14 or more units, the presence of these small trailing chain guides and cables necessitates a significant amount of cleaning.

A clever solution would therefore be highly desirable in these plants, as well as in other process industries.

### A new type of power transmission could solve many problems:

- Cable routing requirements due to bending radius
- FDA suitability of guides
- Difficult to clean
- Wear on cable and cable guide
- Assembly time

### Innovative power transmission

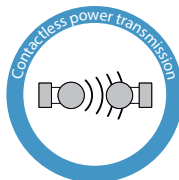
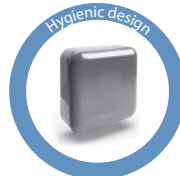
LinMot presented a new solution to the aforementioned cable problem at the SPS automation trade fair at the end of last year.

At the event, a stainless steel two-axis pick-and-place demonstration model was shown with the corresponding gripper. Instead of the usual cable and trailing chain, there was a “transformer track” parallel to the guide’s travel path. On this separate track there was an electromagnetic transducer that transferred energy from the stationary to the moving part of the guide

without contact. The control electronics installed on the stator received the necessary energy to enable the drive to achieve the required speeds. Visitors to the exhibition were then able to marvel at how smoothly and dynamically the parts were gripped and transferred.

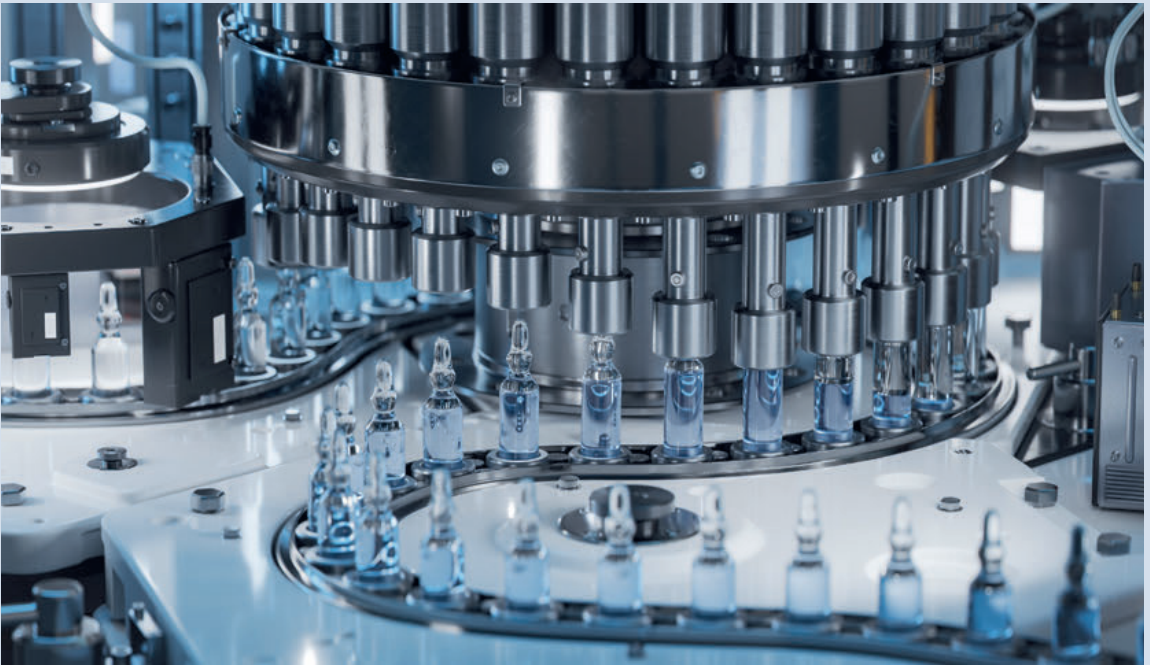
### Futuristic solution in a hygienic environment

LinMot stainless steel linear modules with the innovative “transformer track” will set new standards for hygienic applications in the future. The complete unit offers the machine designers many new possibilities for optimising the system. ■■■



Questions and answers about the cleanroom compatible LinMot linear modules

## ISO 4 cleanliness quality with our linear modules



Food inedible before the expiry date? Pieces of plastic and metal in pre-packed food? Contaminated medicines resulting in damage to health? Automation components are counted among the 8 most critical sources of contamination in the processing industry and are often responsible for unwanted particle emissions. Since these components are often located in the immediate area of the product being processed, e.g. during capping, outfeeding and various pick-and-place processes, it is of crucial importance that the actuators used there, such as those from LinMot, also offer a high level of hygienic safety.



## How does contamination occur?

The cause for the release of particles on classic actuator units lies primarily in the tribological stress, as a result of which wear occurs and thus particle emission. However, other types of contamination such as outgassing, germs and bacteria as well as electrostatic discharges and electromagnetic field can also lead to considerable quality losses and reject rates in the manufacturing process, even in the smallest quantities.

## Is there a solution?

LinMot products score particularly well against the release of abrasive particles. The modules of the DM01 series do without mechanical transmission elements such as couplings, spindles or gears and transmit the force directly to the load to be moved. The guide elements are sealed to the outside and the linear motor is mounted in such a way that contact between the stator and slider is minimal, if it occurs at all. In this way, mechanical wear and thus particle emissions are reduced to a minimum. The easy-to-clean surface also counteracts other types of contamination and makes the modules ideal for use in demanding cleanroom environments.

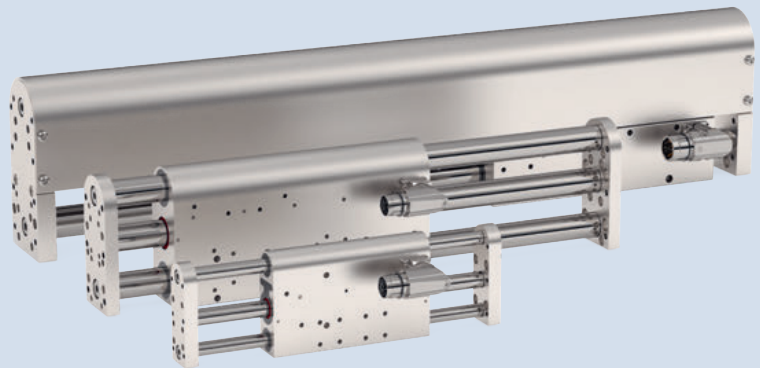
## Are LinMot solutions certified?

As an independent and public research institution, the Fraunhofer Institute provides objective, scientifically founded statements on the contamination properties of LinMot components as well. The particle emission behaviour as the most relevant cleanliness property of the DM01 series was examined by the Fraunhofer IPA according to the standard 184-230609 797 and the linear modules were certified with the test mark "Fraunhofer TESTED DEVICE®" for cleanroom class ISO 4.

## Who benefits from the cleanroom-compatible DM01 modules?

According to a study by the Fraunhofer Institute, the demand for cleanroom-compatible actuator units has increased in the following industries in particular:

- Semiconductor manufacturing
- Medical technology and pharmaceuticals
- Food processing technology
- Microsystems manufacturing
- Precision engineering
- Optics
- Display production
- Photovoltaics



linmot.com

**Are you active in one of these industries and looking for cleanroom-compatible actuator solutions?**

**Find out more about our cleanroom-certified linear modules of the DM01 series.**

A man with dark hair and a beard, wearing a grey button-down shirt and a headset, is looking slightly to the right. He is in a modern office environment with other people working at desks in the background. The lighting is bright and professional.

# Support in the spotlight

The reliable and low-maintenance operation of linear motors is one of the main arguments in favour of them over pneumatics or other drive elements. However, even the most advanced drive technology must be correctly planned, designed, programmed and operated. If technical questions arise in connection with the products, help is needed with commissioning or further information is required, a quick and competent response is required. For this purpose, LinMot has a global, broadly based support team.



## Globally connected

As a global company, it is essential to be able to respond to customer enquiries worldwide. LinMot has commercial and technical contacts at over 50 locations worldwide. The first point of contact for support enquiries is always the First Level Support of the local office or a local partner trained by LinMot. More complex enquiries and tasks are forwarded to one of the specialist teams in Europe, America or Asia for Second Level Support. Very complex enquiries that cannot be answered by second-level support are forwarded to the Swiss headquarters in Spreitenbach, where a support team of five people deals with the most demanding enquiries and problems.



## Impressive figures

Since its launch in June 2018, well over 20,000 tickets have been recorded and processed in the system. This translates into an average of more than 15 new tickets per day. As it is not always possible to resolve a ticket at the first attempt without further consultation, these 15 tickets generate an average of

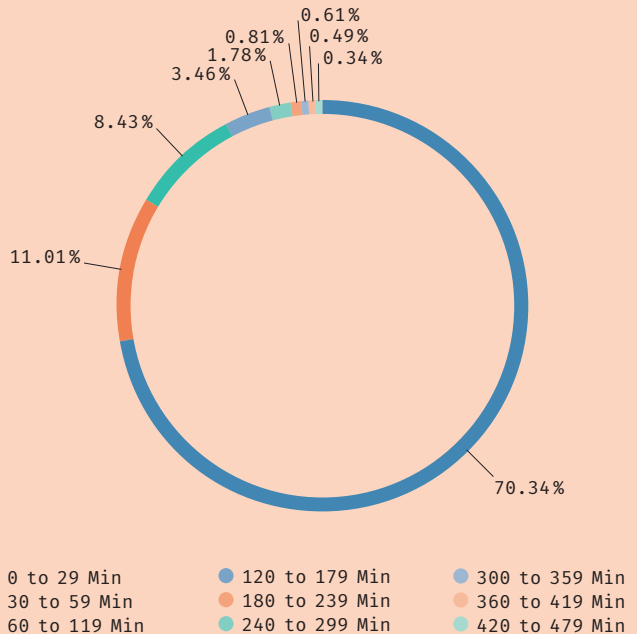
over 62 customer interactions per day. For customer satisfaction, it is important to LinMot that a new ticket is answered personally and quickly. For this reason, LinMot does not use automated responses. The aim is to provide initial feedback as quickly as possible. In 97% of cases, the customer receives a first response within one working day.



## A stable future

The goal for the future of the LinMot support team could not

## First Response (Min)



be more modest. The aim is to continue to respond as quickly and competently as possible to the concerns of customers, partners and agents. After all, if a production machine comes to a standstill, significant financial damage can occur within hours. No customer should feel abandoned in such a situation. The fact that 70% of tickets are answered within 30 minutes shows that LinMot is on the right track. This is an effort by LinMot and its support staff to put its customers' needs first!

# Did you know that ...



many branded products, such as soft drinks, beer, food, hygiene and cosmetic products, and even Swiss watches, are produced, filled, inspected and packaged using LinMot motors?



LinMot linear motors are used to vaccinate fish? This has reduced the use of antibiotics from 47 tonnes to less than one tonne.



in some special applications up to 400 highly dynamic LinMot linear motors are used in a single machine?



LinMot motors can accelerate up to 100g? This acceleration would take a car from 0 to 60mph in less than 30 milliseconds.



by switching from pneumatics to LinMot, a production line with 100 linear motors can save €349,700 a year in electricity costs alone?



there are LinMot motors that have been running reliably for over 25 years and have completed over 6,000,000,000 cycles?



in an average household there are about 7 products that have been closed with a LinMot linear rotary motor?



our motors are used to take samples from the seabed?



the resulting CO<sub>2</sub> savings of 300 tonnes per year is equivalent to the CO<sub>2</sub> emissions of 2.3 million kilometres driven by an average car?



our linear motors are professional footballers? A table football has been automated with LinMot at the Technical University of Regensburg. The LinMot kicker beats every human opponent.

