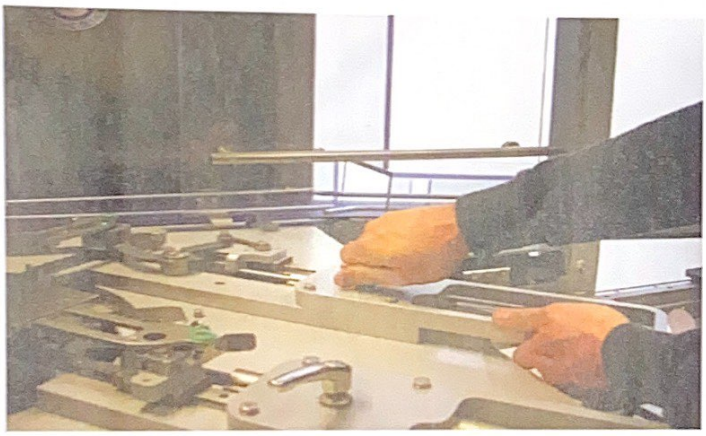
Film wrapping machine makes mechanical-to-electric leap

This film wrapping machine designed for cheese packaging uses linear motion technology to optimize results in a frequent-change environment

By Natalie Craig, *associate editor*

When product characteristic variability is as pronounced as it is between portions of block cheese, with fluctuating density, dimension, and weight, packagers and their packaging machinery partners are met with a special set of challenges. Frequent product changes only exacerbate the situation. But Germany's Alpenland Maschinenbau GmbH (ALPMA) says its new MultiSAN film wrapping (or fold wrapping) machine is up to the task, packaging round and rectangular soft cheeses, as well as cheeses in cylindrical and half-moon formats, while nearly eliminating reconfigurations and reducing setup times.

"There are cheese makers today that make only a few types of cheese, but nevertheless change over their production every two or three hours because they produce every order by the truckload," Helmut Eitermoser, MultiSAN designer at ALPMA, says. The drum beat of every smaller batch sizes applies to cheese manufacturing just as it does so many other manufacturing sectors, reflecting the larger, usual trends of customer-specific product requirements, shorter product life cycles, and booming product variety.



By using linear motion technology, the MultiSAN has been decoupled mechanically so that sensitive components can be folded back out of the foam cleaning area. This cleaning position improves access to the machine for maintenance.

The new film wrapping machine from ALPMA can process a substantially wider range of products with no changeover.

Finding a solution

Cheese makers had long used packaging systems in which a mechanical master shaft with cam drives mounted on it drove the synchronous motion of the individual mechanisms.

"These cam machines are the right solution for packaging just one type of product. They are very precise, cost-effective, and durable," Eitermoser says. "Two similar format shapes—round and half-moon—and different sizes with the same shape can also be processed on these machines with a reasonable effort. This does, however, always require a compromise, which simply means that the packages for each product version are less than optimal. When several different products are to be packed in a folded or wrapped package on the same machine with rapid changeovers, the cam machine reaches its limits. Extensive reconfiguration or even machine replacement is required before a product changeover."

MultiSAN closure modules can be moved with a few manual steps to complete format change in minutes.

Electronic master shaft and cams

ALPMA's answer to this problem was to employ linear motor technology alongside a virtual master shaft and an electronic cam system, resulting in a more flexible soft cheese-packaging machine.

The envelope folds under the cheese, typical for wrapped packaging, are now produced by means of four horizontally mounted LinMot linear motors that each drive one shutter blade. Once the cheese has been wrapped in the packing film by the machine, and has been fixed in place on a round plate by a gripper, the shutters press the protruding film together on the bottom of the product in rapid succession, thus producing the desired fold pattern. Another linear motor axis moves the cheese off of the round plate onto a belt that transports the cheese to the next stations.

Linear servo over rotary choice

"Demo units have shown that rotary servo motors are not well suited for this task, because they take up too much space," Eitermoser says, explaining his decision in favor of linear motion.

The MultiSAN uses model PS01-23x160H-HP-R motors from LinMot that have a diameter of 23 mm (stator)—not including the plug connection on the end—but produce a peak force of 130 N when coupled with the LinMot E1130-DP-HC controller. This combination of small size and performance was unique to this motor selection, according to Eitermoser.

The matching sliders are available as standard products in many variants, for strokes from 20 to 780 mm. The version selected for the MultiSAN has a stroke of 120 mm.

Complete format changeover in minutes

The space-saving form factor of the linear servo motor also decisively contributed to the machine taking up the same floor space as the comparable version with a mechanical master shaft, the SAN 80 TS. The cycle time also matches as both run at up to 80 cycles.

The commonalties end there, though. To make the MultiSAN more modular in construction, ALPMA combined the mechanical unit with the shutter drives into one module that is used in several places on the machines. It is designed to function as a heat sink for the linear motors as well.

Changing formats on the MultiSAN is simple due to the consistent modular construction and the use of linear servos instead of a mechanical master shaft. In just a few steps, the closure module can be removed and installed in a different position without having to disconnect the flexible supply cable for the linear motor. A corresponding program just needs to be started from the touchscreen controls, and then the same machine that had been processing one shape can package another cheese format. Various configuration sets (format sets) can also be used to expand the machine's range.

Optimal packaging results

"We have also made use of the very sensitive and direct reaction performance of the linear motors to provide the operator with an instrument for reacting to variations in product consistency," Eitermoser says. "The responsible parties on site can thus set their own parameters for various consistencies, so that the machine operator can adapt the machine settings on the fly to changes in product characteristics just by pushing a button."

PP-OEM

Agency Sales January 2017 3 Pages

Reps Bring Stability to the Territory

BY JACK FOSTER

Ask Peter Zafiro why he and his company go to market with independent manufacturers' representatives and he'll be quick to let you know that his decision is based on a wealth of experience.

Zafiro, general manager, LinMot USA, Inc., an Elkhorn, Wisconsin-based manufacturer of industrial linear motors, says, "I've gone to market with a variety of business models over the years. I've worked with factory direct-only salespeople, hybrids of direct and independent reps and with independent reps only. What I've found is that I get the most bang for my buck with reps. Here's why: I've found that reps are simply the most professional salespeople in their territories. They're absolutely dedicated to the sales function in their territory."

Contrasting his experience between factory direct and reps, Zafiro continues that "Whenever I've had to hire a direct person for a territory, it takes a while to get them up to speed, sometimes several years. Then when you've done that you can have a problem with maintaining consistency in your sales force. You'll have the normal turnover

Peter Zafiro manning the LinMot USA, Inc., booth at the 2016 Automation Fair in Atlanta, Georgia.

"I've found that reps are simply the most professional salespeople in their territories."

every year not to mention the occasions when someone's wife decides it's time to move back home. Once that happens, you have to go through the same process all over again. You can spend upwards of three years or more putting your sales team together. When you're all done, you're not going to be as productive as you could be with reps."

He adds "Reps are easy to find and to work with. Most of the time all I have to do is ask my existing customers which reps that call on them are good and they'll point me in the right direction."

Reps Return the Feeling

If Zafiro is full of compliments for his rep sales force, it's a mutual feeling for his reps. After all, it was one of LinMot's customers that recommended that *Agency Sales* speak with the manufacturer's general manager.

Zafiro explains that he put together the company's outsourced sales force three years ago. "We did our due diligence with a lot of research ahead of time. We're very happy with the progress we've made. Part of our success is due to the fact that we engage in mutual planning with our reps. We measure them and they measure our performance. We've found that the process can be a bit contentious at times but it's always been very constructive. Both sides take the constructive criticism very well."

LinMot is hardly working in a vacuum when it comes to dealing with reps. Zafiro says that he speaks with other manufacturers and he's surprised that there are many manufacturers that just don't get it when it comes to working with reps. "The important thing they miss is that they really need to treat reps like they'd treat their employees. At the same time, they've got to keep in mind that reps are independent salespeople. They're professionals and their business entails them selling their time."

Identifying Attributes

In putting LinMot's rep network together Zafiro says that perhaps the biggest attribute a potential rep can possess is "a desire and a willingness to work hard. Along the way, we've certainly encountered reps who appear to know what they're doing and their initial story sounds good, but in reality they give off a message that there's nothing more for them to learn. That's a turnoff for us."

If that's a turnoff in a rep's presentation, he adds that when looking at an agency's structure, if they have a high personnel turnover, that's a real negative. "We'd eliminate from consideration any agency that really went through people. In general, we work with reps that have people in place anywhere from five to 30 years. Keep in mind that one of the major benefits of working with reps is that they don't get promoted out of the territory."

If Zafiro and LinMot value the ability of an independent agency to hold on to its personnel, they also value the synergistic approach that reps bring to their work in the field. According to Zafiro, "I've grown to never worry about getting my share of time with our reps. As a matter of fact, I encourage our reps to go through their line card when they're visiting with customers. This is something that a number of manufacturers don't understand — the value that the rep brings by cross selling the full line of products that they represent.

"Remember the direct guy is going to talk only about the products that his company provides. The rep, on the other hand, covers a variety of the customer's needs. It's going to be much more difficult for the direct guy to get a second or third face-to-face with the customer. No so for the rep. That's important and it's critical for us to get in there in front of the customer as often as we can with the rep."

"Keep in mind that one of the major benefits of working with reps is that they don't get promoted out of the territory."

"Most of our reps will let us know on a weekly or biweekly basis any information that's important."

Zafiro comments on a couple of other areas that LinMot has in common with other manufacturers that go to market with independent manufacturers' representatives:

- **Pioneering** — "In previous assignments we have worked with retainers or shared territorial development fees because usually there's no justification for the rep to receive no income while he's trying to build the business. I will say, however, that reps welcome any new products we offer because they find it opens the door for the sale of other products that they represent."
- **Training** — The majority of manufacturers that work with reps recognize the value of regular training efforts and LinMot remains a believer in training. "We have at least four training sessions annually. We start with a beginning course and then move on to more advanced efforts. Since we're a technical company, our training may take a bit longer and it takes us about 3-5 years to bring our reps fully up to speed. By that I mean to bring them up to a level where they can exude confidence in the product and make the sale."
- **Communication** — "I'm cognizant of the fact that time is important for our reps and they need time to visit customers and make sales. At the same time it's important for us to know what's going on in the territory. That's why we have formal quarterly reports from our reps and we ask them to keep in touch with us informally in the meantime. Most of our reps will let us know on a weekly or biweekly basis any information that's important."

He adds that he's aware that some other manufacturers show a preference for more frequent communication. "When I hear that I ask my manufacturer peers what they do with all the data that they collect. They may read the information but for the most part they don't do anything with the information. We basically just want to know what's going on."

- **Rep Council** — Zafiro says that thus far LinMot doesn't have a rep council but will probably implement one in the next couple of years. "Right now as the general manager I am in close contact with our reps and get a good deal of input from them. I know what's going on in the territory. To supplement that we have quarterly planning meetings and I usually visit each agency twice a year. That provides us with the frequent feedback we're looking for."

In conclusion Zafiro says that his experience with reps has been a very positive one. "If there's ever been an error in serving the customer, there's no playing the blame game. Instead we agree to a collaborative effort to do the right thing for the customer."

MANA welcomes your comments on this article. Write to us at mana@manaonline.org.

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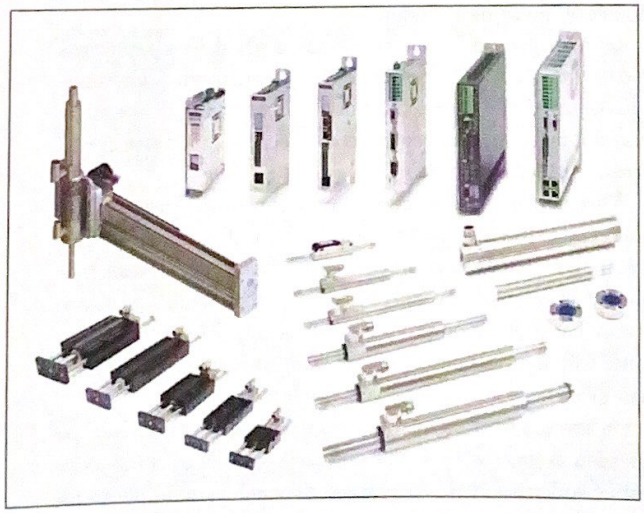
LinMot is the world's leading manufacturer of direct-drive, industrial linear servo motors for use in production machines and automation applications around the world.

Established in 1997, LinMot has been manufacturing linear motors and actuators to traditional, high-quality Swiss standards in company-owned facilities in Europe. Every LinMot linear motor delivers high speed, long service life, and complete controllability, making them your best choice for use in demanding and highly dynamic positioning applications. Their U.S. headquarters in Elkhorn, Wisc., serves the entire Western Hemisphere and offers very distinct sales-oriented advantages to their customers. These important advantages include U.S.-based technical assistance and exclusive LinMot linear motor application and sales-support programs.

LINMOT IS THE world's leading manufacturer of cylindrical linear servo motors for industrial production machines and processing applications. The motors employ a direct electromagnetic principle to provide linear movement without the use of cams, gears, belts, or other mechanical devices. Currently offered are over 15 different linear motor configurations with peak forces ranging from 7 to 600 pounds. These configurations provide over 300 standard motor specifications producing speeds up to 200 in./s, accelerations to 100g and having stroke lengths up to 82 in. All LinMot motors are designed for use in rugged industrial environments, clean-room processes, and food production facilities.



In addition to the extensive line of standard motors, LinMot offers industry-leading, specific-purpose products including high-performance motors, IP69K stainless-steel motors, and our latest innovation, a two-axis combination of a linear and a rotary motor in a single, compact assembly.

LinMot®

Optimization of Total Operating Costs Using Electric Linear Drives

TCO analysis demonstrates high potential for savings, even for simple applications, by replacing pneumatic drives.

BY ERNST BLUMER, LINMOT

Electric linear drives are replacing conventional pneumatic cylinders in more and more applications. The reasons include poor efficiency, high costs for commissioning, reconfiguration, service and maintenance, and the limited control capabilities of pneumatic systems. A recent total cost comparison demonstrates that electric linear drives, at current prices for components and electricity, pay for themselves within a few months even for simple point-to-point motions with two end positions. This also helps to reduce the carbon footprint significantly. In addition, they provide greater flexibility in the design of production processes and production monitoring systems.

Pneumatic drives are characterized by lower acquisition costs, robustness against external influences (e.g., temperature variations and dust), and high resistance to overload. They are also simple to operate and do not require holding current when installed in a vertical orientation. Compressed air is also used for transport and cleaning tasks in many shop floor and industrial environments, so that compressor systems need to be provided in any case. It's no wonder that pneumatics are used in a wide range of applications and can be found in many factories.

Figure 1: Tubular linear motors are used more and more often to replace pneumatics.

Compressed air, however, is one of the most expensive energy media, because compressors can convert only a small portion of the input energy into useful power. The great majority is dissipated as heat loss. The latest technology can achieve an efficiency of about 30 percent. Further increases are nearly impossible, as the physically limits have practically been reached. In addition to the already high costs for the motor, compressor, startup, and run-on losses, and losses from compressed air handling, in practice additional losses occur due to leaking distribution systems. In reality, therefore, after additional conversion loses in the actuator (without optimization) only about 5 percent of the input energy is available as useful power. Optimal design of the pipework system and actuators prompt tracking of leaks, and heat recuperation systems can increase the efficiency. The German Environmental Ministry rates the potential energy savings at 20 to 40 percent, while other experts calculate significantly greater potential savings.

PNEUMATICS: 2/3 OF OPERATING COSTS ARE SPENT ON ENERGY

Even if all of these potential savings can be realized, however, compressed

LinMot USA, Inc.

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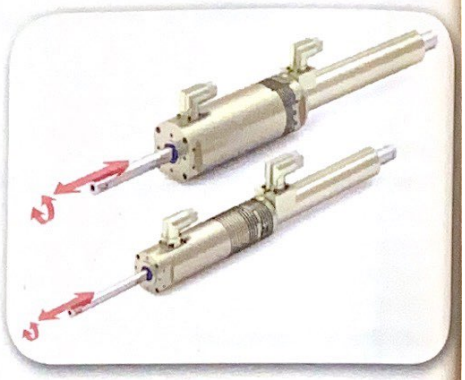
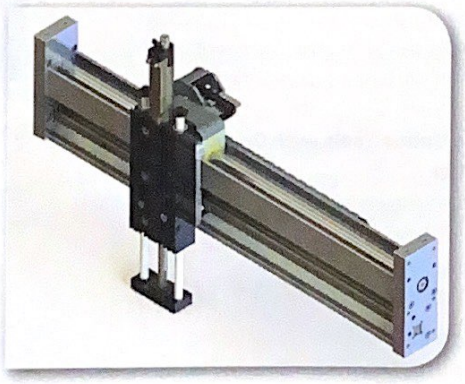


Linear-Rotary Motors



F Guide - Integrated Linear Actuator

In addition to the extensive line of standard motors, LinMot offers industry leading, specific purpose products including high performance motors, IP69K stainless steel motors and our latest innovation, a two axis combination of a linear and a rotary motor in a single, compact assembly.

Join the rapidly growing field of automation professionals who have already discovered the linear motion advantages only LinMot products provide... today's proven performance for tomorrow's motion needs.

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Direct drive combines linear and rotary motions

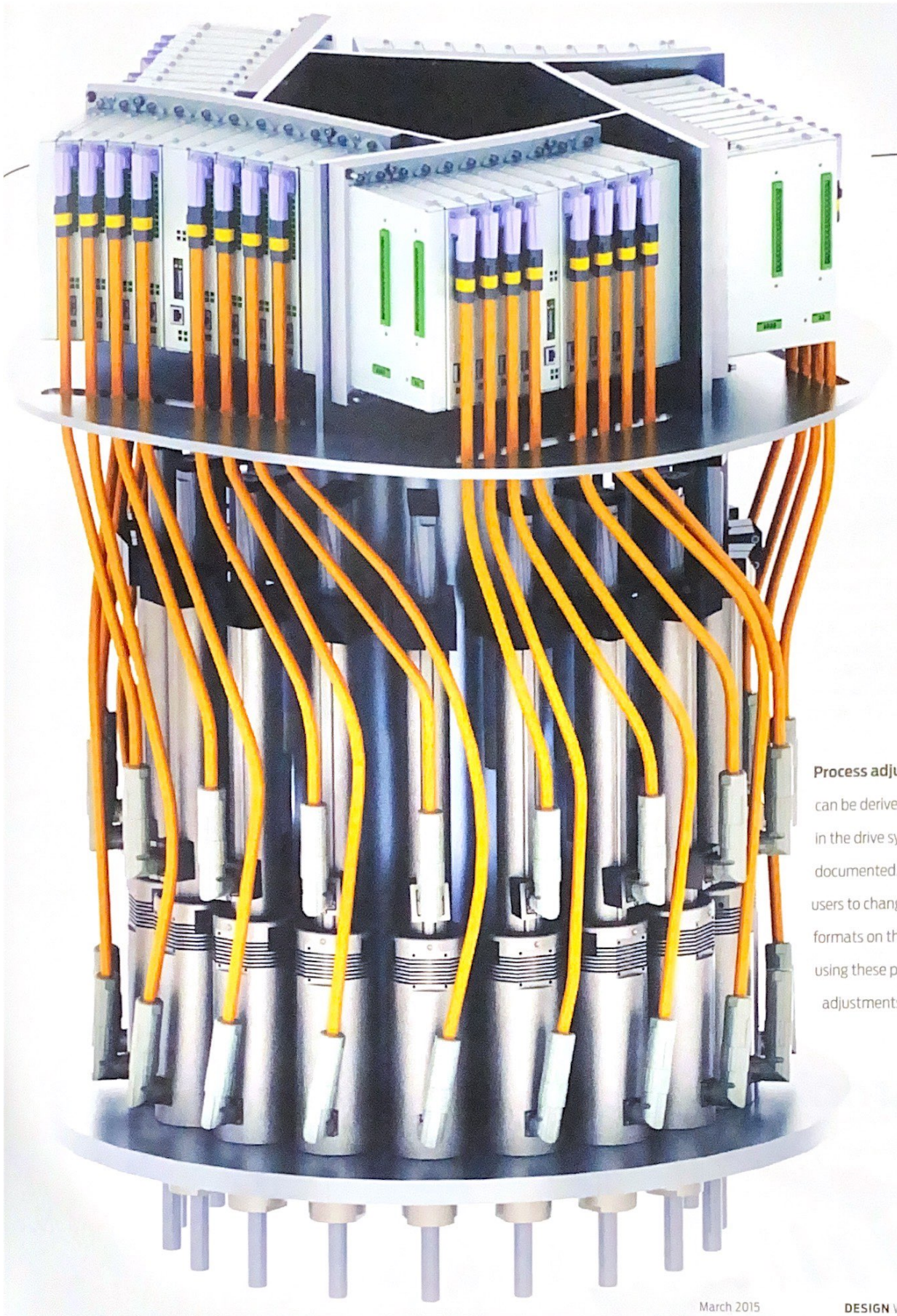
Linear-rotary motors provide users with greater on-the-fly process flexibility.

Ernst Blumer
LinMot & MagSpring

Linear-rotary motions are required in many machine applications, such as carton closing or handling and pick-and-place systems. For the first time, LinMot, a manufacturer of linear motor systems, has combined a linear motor with a servomotor in a compact unit that has significant advantages over the purely mechanical, pneumatic or partially electric drive solutions available to date.

For complex tasks such as threading, closing, pick and place, stacking, or aligning, designers must provide a linear-rotary motion. One example of this is a PET bottle closing machine. The closure cap on the cover must be placed on the bottle using a linear motion along the longitudinal axis and then screwed onto the threads of the bottle opening with an additional rotary motion until a defined angle or a certain torque has been reached. The solution to this task was one of two approaches for concentric closing machines.

1 Both the linear stroke and the rotation of the closing spindles are derived and synchronized purely mechanically from the rotary motion of the carousel using cam disks (linear stroke) and gears with a magnetic clutch (rotation).



Process adjustments can be derived from data in the drive system and documented. This allows users to change formats on the fly using these preset adjustments.

2 A servomotor is used for the rotation and is moved up and down. The linear stroke is derived from the motion of the tabletop using plate cams, just as in the purely mechanical concept. This type of closing machine is frequently also called a servo-closer.

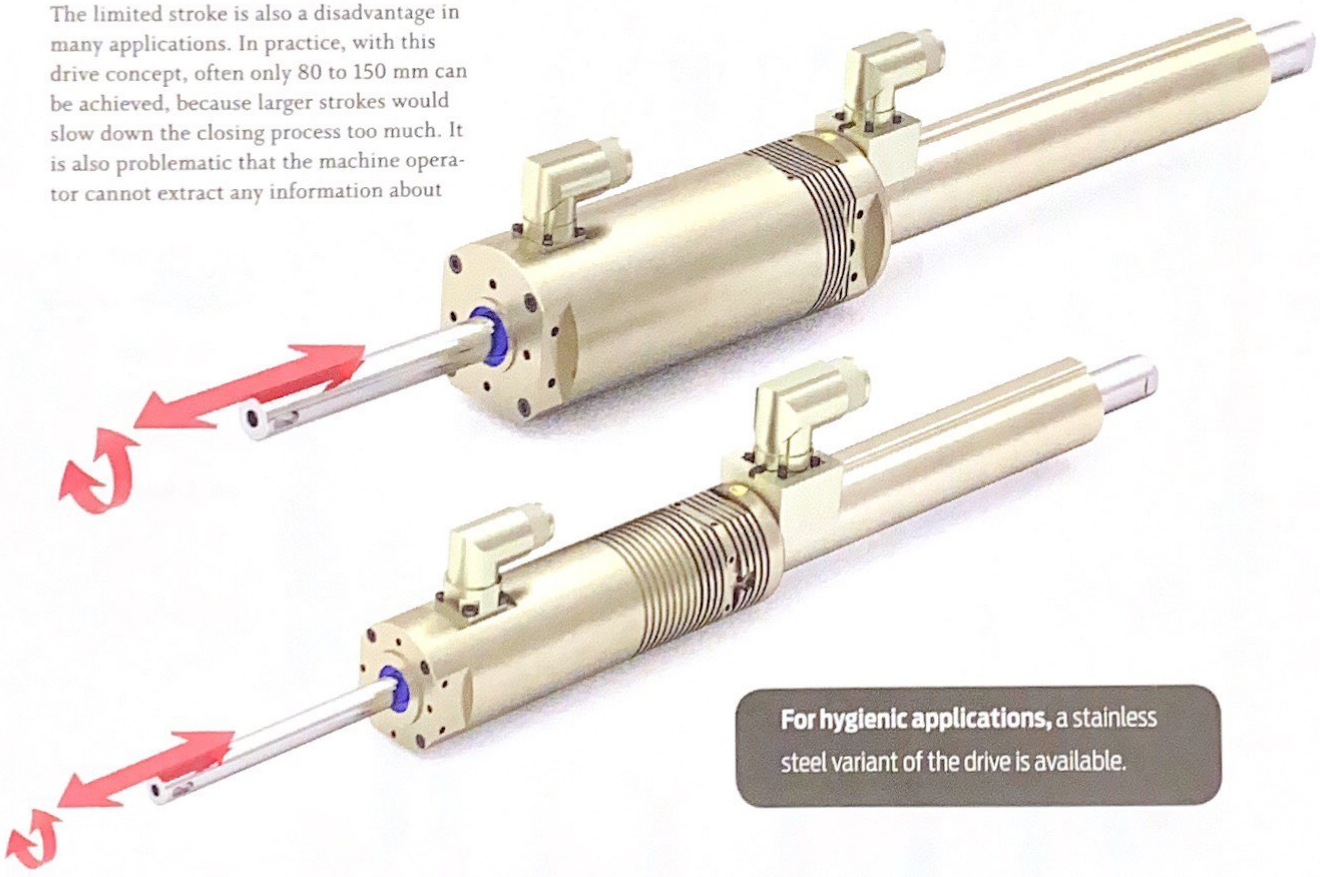
These approaches, however, have their own problems. One of the great drawbacks of the purely mechanical solution is that it lacks flexibility in the selection of the process variables, such as the tightening torque and press force. The torque, critical to the screwing process, can be adjusted and modified only by means of the magnetic clutch or hysteresis clutch on the spindle. The process parameters cannot be influenced during operation. The limited stroke is also a disadvantage in many applications. In practice, with this drive concept, often only 80 to 150 mm can be achieved, because larger strokes would slow down the closing process too much. It is also problematic that the machine operator cannot extract any information about the wear process from the drive system. Therefore, additional separate sensors may need to be installed and analyzed for process monitoring. In addition, the wear process for the purely mechanical concept depends on the speed of the carousel, due to the direct mechanical clutch. This can degrade process stability, especially when starting and stopping the system.

In more modern machines, a servomotor on each spindle provides the necessary rotation. But this can only solve part of the problems with the purely mechanical solution. The torque can indeed be adjusted electrically, and modified while running. The actual torque applied can also be determined by analyzing the drive data.

But these advantages come with a new disadvantage: Because the servomotors generally have to be moved along with the closing head, expensive flexible cables are required that can be used in a cable guide chain. These complicate the design, make it more difficult to clean and degrade the overall reliability of the machine. The stroke and press force still cannot be adjusted electrically, and the maximum stroke that can be achieved remains relatively small at 100 to 150 mm. Errors, such as crooked caps, can still be detected only by expensive downstream inspection systems.

Only the comprehensive use of electric drives for both the linear and the rotary motion can help here.

Users can then flexibly adapt not only the torque and the number of turns, but also the stroke, to the process requirements—even during the closing process, if necessary. The machine operator also has complete flexibil-



For hygienic applications, a stainless steel variant of the drive is available.

Design World 2015 3 Pages

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ELECTRIC ACTUATORS:

More choices for more applications

FASTER controls, easier integration, lower drive prices and the Ethernet have all helped electric actuators, also known as electric linear drives, move into new applications.

"Except for better efficiency," noted Ernst Blumer, director, Worldwide Sales & Marketing, LinMot, "the performance of electric actuators has not undergone big changes or improvements in the last few years. The variety of actuators, however, has increased. Because of this greater range of actuators, you'll find them being used in more applications."

Concurrently, the prices for drives for electric actuators have come down, which has also opened many possibilities for new applications. "Component costs for electric actuators used in industrial and manufacturing applications are cheaper than ever before," said Aaron Dietrich, director of marketing, Tolomatic Inc. These components include screws, bearings, motors, cabling and drives. "This trend helps electric actuator technology fit into more and new applications where alternative technologies—such as pneumatic, manual and hydraulic—were typically deployed."

Linear-rotary motors in the PRO1 series from LinMot can help you quickly and easily implement linear and rotary motions. Both the linear force (press force) and the torque (tightening torque) can be controlled and monitored independently of each other. Designers can thus adapt motion sequences to the task's requirements profile easily, ensuring consistent product quality. Their compact size and extensive accessories make integration into a machine easier.

In many applications, servomotors are replacing induction motors because of their performance and energy efficiency. Direct drives are replacing traditional motor-gearbox combinations because of their high dynamic performance, high precision and long life. And electric actuators are replacing pneumatic cylinders in many applications for similar reasons.

But the biggest improvements in the last five to ten years can be found in the control systems integrated with electric actuators, noted Blumer. Faster bus systems, like industrial Ethernet and real-time communication, make the use of electric actuators simpler.

Servo systems require fast communication and exchange of real-time data between the drive and the overlaid machine control. The bus was always the bottleneck in these systems. Now with the much higher data rates and real-time capacity of industrial Ethernet, the integration and the use of electric actuators is easier.

> "Stepper and servodrive options with Ethernet protocols (Ethernet/IP, Modbus, TCP) turn single-axis actuators into simple, low-cost motion devices with infinite positioning, precise control and longer life."

KEEPING IT CLEAN

Requirements for hygiene in food and beverage applications have grown. Part of the reason behind this requirement is due to the reduced use of sugar. First, consumers are reducing their consumption of sugary foods. Second, sugar has often been used as a conservation additive. Thus, the less sugar used in food means an increased risk of bacteria and other potential health hazards. Therefore, new machines that fill or pack reduced sugar products need to meet higher demands for hygiene and they need to handle more frequent cleanings. Plus, food and beverage applications are using cleaning agents with higher chemical concentrations and using higher water temperatures during cleaning.

To meet these needs, manufacturers of electric actuators have begun offering stainless-steel actuators with hygienic design and high protection rates up to IP69K. "Electric actuators are available in 300 stainless steel with round bodies, welded joints and other configurations that meet USDA requirements and IP67 and IP69k ratings for caustic washdown and other environments. This is ideal for the meat, poultry and dairy processing markets," said Dietrich.

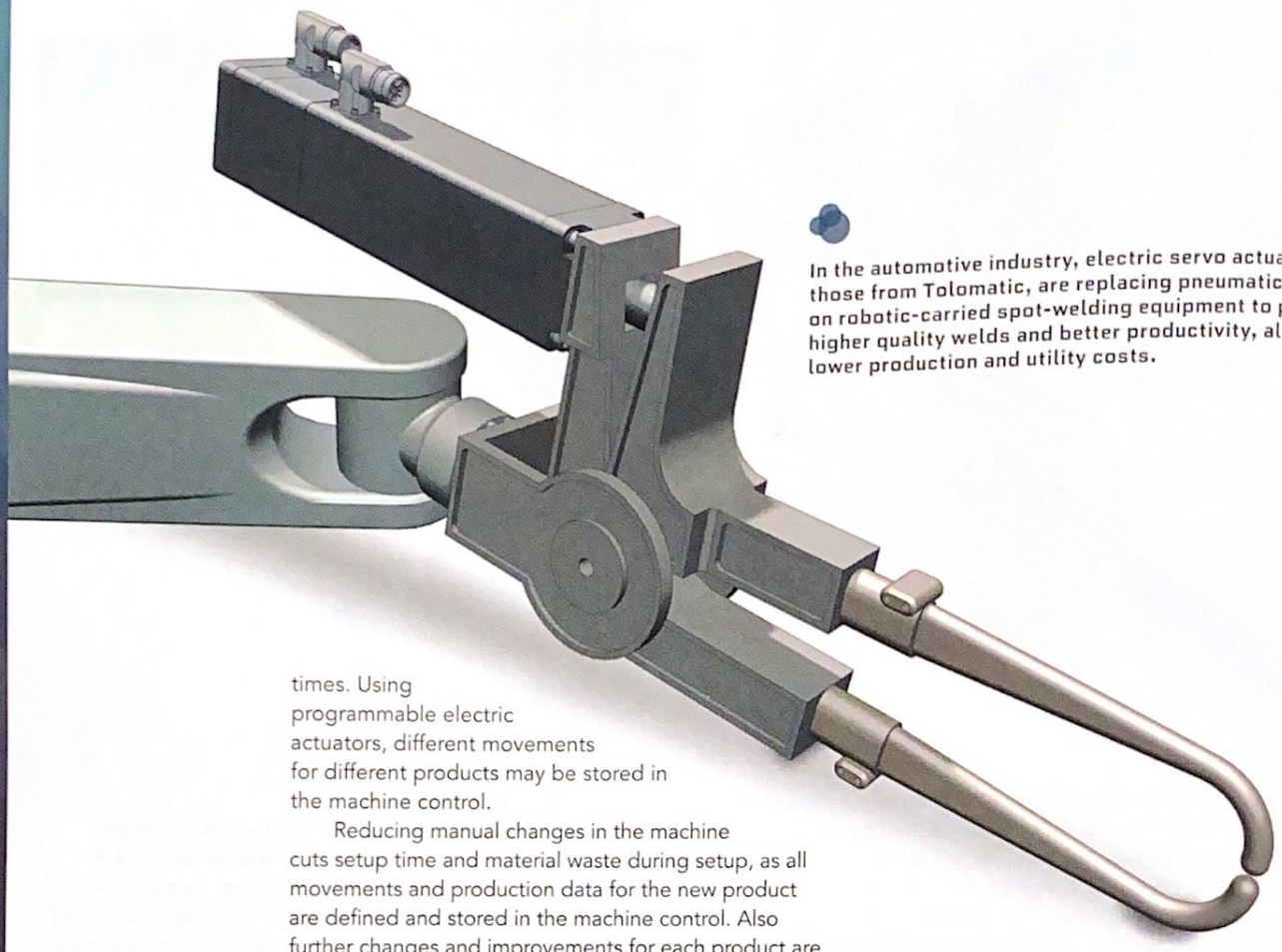
KEEPING TRACK

Another trend in actuators is the requirement to meet new regulations and traceability needs.

Traceability has become an important feature for customers. Of course, quality control is still important too. With just-in-time production, production lot quantities are smaller and product changes on machines and production lines more frequent.

With newer functions and more flexibility, electric actuators help you design adaptable machines with short product change

Electric Actuators



In the automotive industry, electric servo actuators like those from Tolomatic, are replacing pneumatic actuators on robotic-carried spot-welding equipment to provide higher quality welds and better productivity, along with lower production and utility costs.

times. Using programmable electric actuators, different movements for different products may be stored in the machine control.

Reducing manual changes in the machine cuts setup time and material waste during setup, as all movements and production data for the new product are defined and stored in the machine control. Also further changes and improvements for each product are automatically stored and documented in the machine control and will guarantee that a product will be produced with the same quality as in the last production lot.

Electric linear actuators are an alternative to pneumatic cylinders in several applications because of the flexibility they deliver in the design of production processes and production monitoring systems. In conveying applications, for example, diverting and sorting functions are more frequently controlled using electric actuators. Typically, pneumatic actuators have been used, but the required manual adjustments were often subject to human error. Plus, the pneumatic actuators could only handle a small amount of variability in product sizes. Electric actuators are flexible by design.

In today's material handling applications, volume has increased, especially in package size and variability. Electric actuators easily handle these variability requirements and, over the life of the motion system, can be less expensive. In packaging machines, consumer-product manufacturers are producing more package sizes with the same manufacturing lines, which require equipment to be adaptable enough to handle different product sizes and types.

For linear motions in many applications, the efficient electric linear motor in tubular form is a good substitute for many pneumatic components, especially if you compare the total cost of ownership and service.

One of the newer variations of linear electric actuators is the linear-rotary motor from LinMot. The design of this linear actuator combines a linear motor with a servomotor in one unit. The linear-rotary motors can perform any desired combination of linear and rotary motions, and the linear force and the torque can be controlled independently of each other.

For example, this type of actuator easily handles complex tasks such as threading, closing, pick and place, stacking, or aligning where you need linear-rotary motion. In a PET bottle closing machine, the closure cap on the cover must be placed on the bottle using a linear motion along the longitudinal axis, and then screwed onto the threads of the bottle opening with an additional rotary motion until a defined angle or a certain torque has been reached.