

Motor Technology Makeover

Efficiency, Size, Space and Mounting Requirements Highlight Customer Requests for No Compromise

Matthew Jaster, Senior Editor

No compromise. No shortcuts. No cheap imitations. You get the point. The motor has to be exactly what the customer wants or they'll look elsewhere. They'll find what they need in a growing market that understands motor applications are evolving and the products and technologies need to follow suit.

Luca Bongulielmi, head of business management EMEA at Maxon, sees an emphasis on miniaturization, the increased efficiency of drives and an increased focus on smart manufacturing and predictive maintenance for motors in 2019.

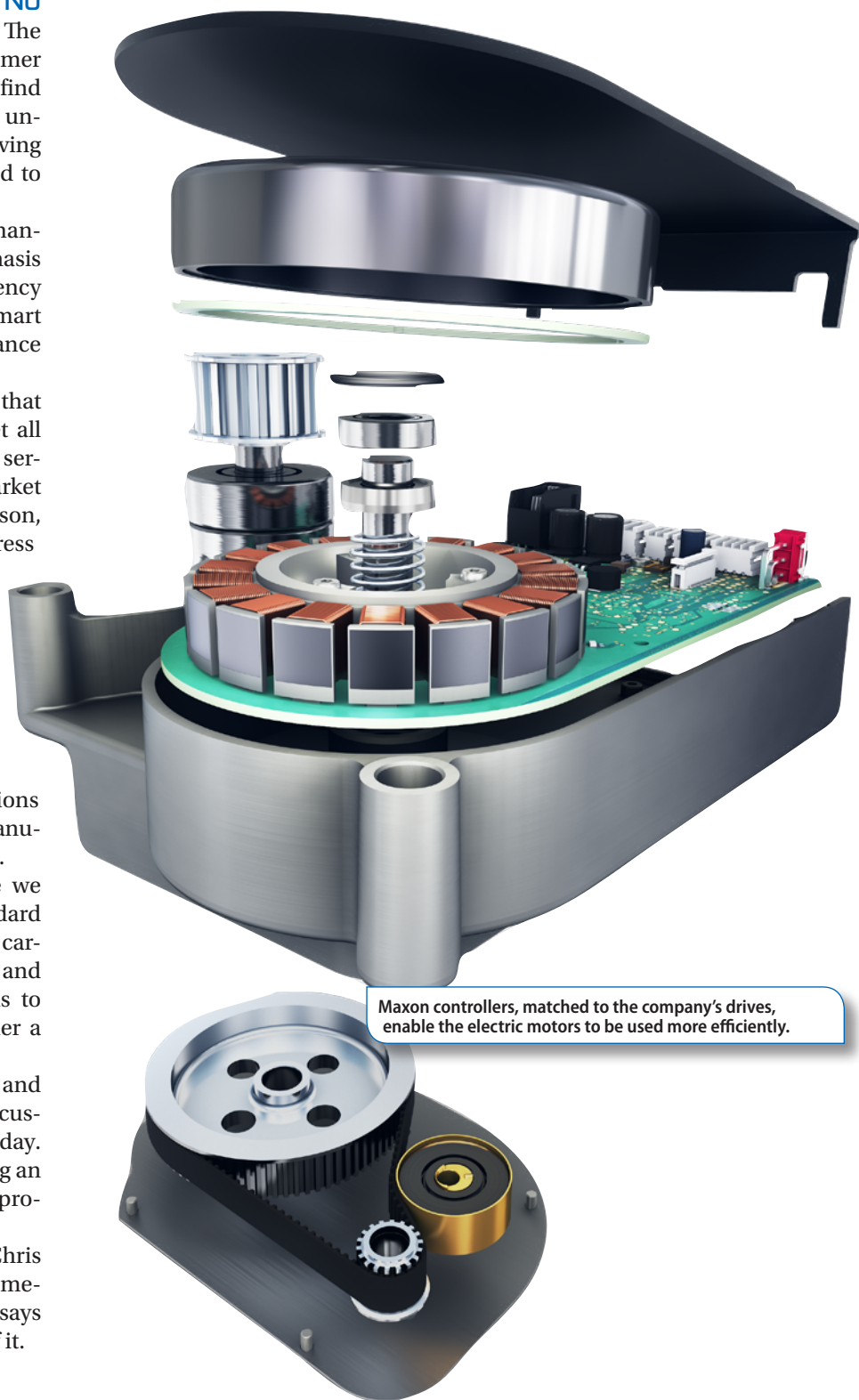
"Our customers demand solutions that fit their applications perfectly and meet all their requirements, as well as excellent service. As a result, we need to know the market and its regulations very well. For this reason, we have set up five business units to address the following markets: medical, transportation, aerospace, industrial automation and e-mobility & robotics," he said.

At Kollmorgen, Christopher Radley, senior manager, global platform commercialization, is also seeing an increased demand for solutions that specifically fit the customers' applications (as opposed to customers adapting manufacturer's standards to their application).

"This suits Kollmorgen well because we have a broad range of motor types (standard housed rotary servo motors, frameless, cartridge, direct drive, steppers, and linear) and we can quickly adapt standard designs to meet customer requirements or consider a completely new design," Radley said.

Words like "portable," "miniature," and "flexible," seem to come up in most discussions regarding motor technology today. Radley believes it's really all about getting an increase in performance without compromising on cost or efficiency.

There's also a question of control. Chris Moskaites, product manager—electromechanical solutions, Lenze Americas, says that customers would like much more of it.



Maxon controllers, matched to the company's drives, enable the electric motors to be used more efficiently.

"They want simplicity, a reduced effort in motor design, installation and maintenance that will reduce engineering time by reducing the number of variants."

This is where smart manufacturing comes into play in the motor market. Lenze's Smart Motor, for example, offers the simplicity of a motor direct on line (DOL), but offers selectable speeds and ramps with a high overload capacity—a capacity that enables utilizing a motor that is two frame sizes smaller. Moskaites said this combination and torque profile is perfect for further enhancing horizontal conveying applications.

There is a current trend in the market toward defined start and stop ramps in order to improve the performance of conveying applications. There's also a need to develop energy efficient solution that fulfill upcoming energy regulations from a technical perspective. Companies are challenged to reduce the time and effort required for dimensioning, design layout and installation, as an answer to increasingly shorter project timer. Finally, there is a demand for standardization and reduction of complexity, so that even large numbers of drives can be handled with little effort.

Moskaites said this is a large competitive benefit for the machine builder.

"They can standardize the cabinets as the components inside the cabinet will remain the same, no matter how many conveyors are connected to the line. In case an additional conveyor segment is required, the machine builder can add it easily through our distributed power bus concept, and only needs to tell the PLC that an additional segment is existing. Due to the electronics added to the motor the cabinet size can be drastically reduced as thermal protection and drive control are already included. And last but not least - if the customer needs to change the speed of the Smart motor on site, this is also no problem - it can be done by smart phone via NFC," he said.

Maxon's IDX is a new drive setup for industrial applications. "This is a modular drive system for applications in industrial automation or logistics

automation that consists of a motor and an integrated EPOS4 controller that can be used in a wide variety of applications. The IDX compact drives will be configurable online," Bongulielmi said.

Kollmorgen's ultra-strong permanent magnets and efficient electromagnetic designs help OEMs of equipment such as AGVs/AGCs/AMRs and cobots: Not only can they extract greater torque without increasing the

size of their equipment, but they can also do more work with the same battery life.

"Our industrial experience with Functional Safety, high precision/accuracy applications, and the ability to match specific industry interfaces, positions Kollmorgen to help these portable devices meet our customer's 21st century requirements," Radley said.

For standard housed rotary servo motors, Kollmorgen's second-generation



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Radley said that customers can replace existing motors without changing their mounting yet gain substantial performance improvements. Or, for customers looking to reduce machine/motor size, they can retain the same level of performance.

And what are the significant factors for a change in customer demand today?

“Optimization of the OEM machine design means every bit of space, every bit of power, every thermal consideration, feedback type, connector, mounting...it all matters. Customers aren’t looking to compromise. They are looking for an exact solution not one where unnecessary oversizing drives up cost,” Radley said.

Radley discussed additional factors including the fact that companies now have *global* requirements, therefore, motor solutions need to work in any geography and meet the local standards/approvals. Quick-turn prototypes are also a must in this market

today—even for exact-fit products. Customers require lead-times as short as standard product lead-times.

At the end of the day, most customers want capable sales people and the ability to talk directly to the design engineer,” Radley said. “Here’s what I need, when can you get me drawings, a prototype, etc.?”

Bongulielmi said that he sees projects are becoming more extensive and complex due to stricter regulations. The general trend is towards mechatronic drive systems—with a holistic approach.

“In other words, customers are increasingly reluctant to opt for a single DC motor but for an integrated mechatronic solution such as a robot joint. These designs often involve a battery and the solutions are becoming more efficient and more intelligent. In addition, the controller plays an increasingly important role in monitoring the drive.”

The different components are connected more strongly with each other in 2019, so communication becomes more and more important.

“Maxon Motor controllers are playing an increasingly important role in this respect. They are perfectly matched to our drives, which in turn is an advantage for our customers, as it enables our electric motors to be used more efficiently. The more we develop mechatronic systems, the closer we

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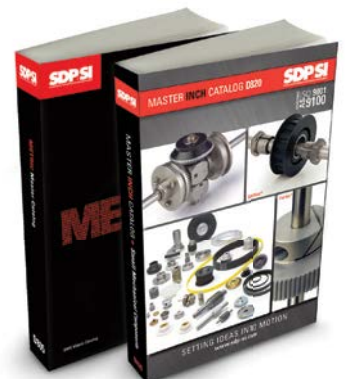
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get to the end user of the application," Bongulielmi said.

Kollmorgen has long worked with customers to build what were once called higher level assemblies (integrated mechanical/electrical assemblies) and are now typically called mechatronics.

"Over time this has evolved from a focus on matching components to insure performance while reducing suppliers, to one in which the mechatronics is critical to achieving a result that would not otherwise be possible. We also see robotic joints as an example of this in which the gearing is integral to the frameless motor itself to maximize performance in the smallest possible footprint. This takes us from simply mating together existing independent parts to building a highly specific solution to match an application," Radley said.

Moskaites said that more customers are realizing the benefits of decentralized technology as a measure for cost savings and reduced engineering and labor time.

"Requests for the Lenze Smart Motor and Motec have increased. With five adjustable speed levels - and the infinite selection of rotating direction - definable start and stop ramps, as well as an electronic contactor and motor

protection function, the Smart Motor's integrated electronics eliminate the components, reversing contactor and motor protection circuits, as well as the polarity reversal required for mains motors, enabling real space savings," he added.

Like every other component in mechanical power transmission, motors have their own set of unique challenges.

Bongulielmi at Maxon returns to the discussion of service and delivery time.

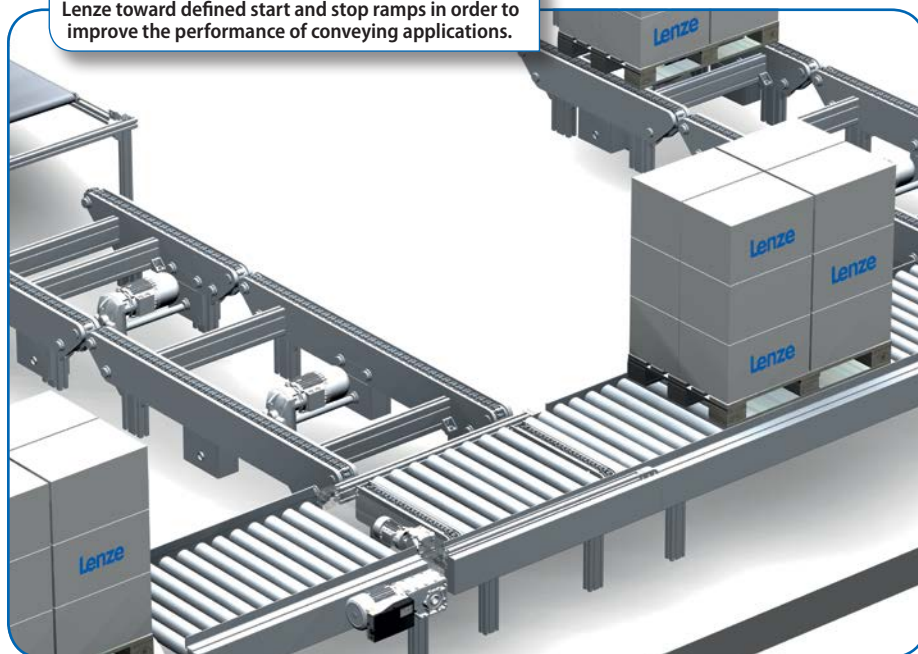
"The speed of service and delivery has to be constantly high, at the same time quality must not decline," he said.

Radley cites a few other growing challenges. "IP protection is one. It takes a considerable time, effort and capital to engineer entire motor lines. Return on Invested Capital (ROIC) is also difficult if global competitors can simply reverse-engineer a design. You also have rising material costs that fly in the face of lower market prices."

As always, you can add the shortage of technical talent and expertise to the mix as well.

"Challenges in the industry today include the shortage of an educated workforce, compliance with mandated efficiency standards, complex engineering requirements and energy efficiency," said Moskaites.

There is a current trend in the market according to Lenze toward defined start and stop ramps in order to improve the performance of conveying applications.





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Many of these challenges may be solved with the trend toward more compact mechatronic solutions.

"Particularly as electrification—replacement of hydraulic and air—continues to increase.

We also expect greater migration to battery-powered portable equipment, in industries that are unexpected," Radley said. "We're inclined to believe there will be numerous breakthroughs in feedback: (a) lower-cost, higher-precision, and higher-temperature; (b) collapse of additional sensors such as accelerometers, temperature and humidity into the feedback device. We are always on the lookout for new magnet material and for new tools to increase flux focus."

Moskaites said there's going to be a continued emphasis on easy installation, commissioning and troubleshooting. "Also an increased emphasis on energy efficiency—including not only the motor but the complete gearbox and drive—in order to prevent an increase in costs."

Bongulielmi at Maxon said there will probably be more standard solutions, i.e. plug-and-play drive sets for defined markets. The customer should be able to integrate these systems into the application as easily as possible. This saves development time and brings the product to market faster.

"In addition, it will probably be possible in the future to buy the service and not the hardware - in other words, pay per use. This means that customers only pay for their drive systems when they are up and running," he added. "And last but not least, the development of motors will probably move more in the direction of high-torque direct drives."

In conclusion, there are plenty of factors and functions that customers want from motor and drive units in 2019. Thankfully, many of these requirements are being met with mechatronic solutions and smart manufacturing. Suppliers have a handle on size, space, efficiency and mounting concerns and know what needs to be provided on the component as well as the system level to appease each individual application. As areas like mechatronics and IIoT grow, suppliers will have a greater ability to provide solutions without compromise. **PTE**

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