

Familiar Goals, New Solutions

Gearmotor manufacturers find new ways to push the envelope.

Alex Cannella, Associate Editor

It's almost possible to say that it's business as usual in the gearmotor industry. End user demands haven't changed much from past years, and manufacturers continue to improve their products in tried and true ways: smaller, lighter, more efficient, cheaper. Many of the big gearmotor manufacturers are putting out new products that don't so much push the industry forward as offer existing technology in fields they hadn't been covering before.

Many of those fields, however, are being targeted based on individual manufacturers' perceptions of where the industry is at and where it's going. Brother sees mobility becoming a key factor in motors in the future. Siemens is focusing their innovations on conveyor applications. Rexnord is working with the Internet of Things. Everyone is finding new ways to push the usual metrics forward.

Brother

MIND ON MOBILITY

Brother's most recent contribution to the industry is a brushless DC gearmotor, which is mostly just a translation of Brother's AC induction motor line into a DC gearmotor package. The gearmotor is lubricated and sealed for life, significantly reducing maintenance, and features a wide speed control range and several shaft configurations.

But according to the Vice President of Brother's Gearmotor Division, Matthew Roberson, even if their new gearmotor doesn't bring much new to the table for Brother, it does bring something new to the gearmotor industry, namely Brother's gearset design. Brother's gearboxes are designed to utilize hardened steel hypoid gearing as opposed to worm gearing, which translates into a higher efficiency design.

"A worm gear is great, it's been around forever, but once you start getting a little higher ratio, it becomes very inefficient," Roberson said.

And as Roberson sees it, efficiency is going to become increasingly important for Brother's gearmotors, because one

key factor is becoming more prevalent: mobility.

Brother's mind is on mobility, and they're seeing the demand for it everywhere. Factory and warehouse automation is on the rise, and with it the demand for light, portable gearmotors. The medical industry is similarly hungry for mobility, with equipment that needs to be light, mobile and ergonomically safe. Even with automation in other sectors, such as with autonomous vehicles beginning to handle last mile deliveries, size portability become paramount. Across the board, Brother is seeing mobility as a deciding factor, and they're responding.

And a primary factor to making Brother's gearmotors competitive in what they see as an increasingly mobile space is energy efficiency. Many of the aforementioned applications require battery power to function, and motor efficiency is a key factor to making sure that battery lasts as long as possible. While motor efficiency accounts for costs saved over time in energy costs at a factory, for mobile applications, better efficiency in all systems directly contributes to uptime, making it even more paramount.

"In portable applications, you're relying on battery power," Roberson said. "If you have inefficiencies in the gear section of your gearmotor, that's really just energy lost, which means drainage of the batteries and shorter life. So in mobile applications, which is where we're focused...the efficiency, not only of the motor but of the gearing, becomes important."

Siemens

DESIGNING FOR CONVEYORS

On the topic of lighter and portable is Siemens' Simotics S-1FG1 servo geared motor. As a servomotor attached permanently to a gearbox, it gets the best of both worlds: a smaller footprint without the usual adapter plate between them, as well as all the benefits of a compact, light servomotor.

The S-1FG1 is designed for use in material handling and conveyor applications. In particular, Siemens has designed



the S-1FG1 for situations that require rapid-fire positioning, such as in a diverter arm that needs to separate products out between two conveyor lines.

The real news coming from Siemens, however, is about their Simogear electric monorail gearmotor. Whereas the S-1FG1 is compact and light, Siemens' new electric monorail gearmotor is designed for heavy duty functions. It's designed specifically to carry heavy loads of up to 8,000 pounds in electric monorail and conveyor applications most commonly seen in the automotive industry.

Thanks to a helical bevel gear design, this electric monorail gearmotor is designed to bear those titanic loads with minimum wear on its gears to lengthen its lifetime. It was built with significant loads of radial and axial forces in mind. The gearmotor comes in 3-10 horsepower variations and utilizes a NEMA premium motor. Siemens, meanwhile, is looking at producing even more energy efficient versions of this motor in the future.

Baldor

KEEPING OIL IN AND WATER OUT

There are a few things that have changed around the factory at Baldor. For one, they've started using air gages when manufacturing their products, which allows for greater accuracy when repeatedly manufacturing parts by constantly checking for deviations in the process and adjusting them back into line when they start reaching defined tolerances.

But something that will affect end users a bit more directly is an adjustment they've made across all of their right angle and parallel shaft gearmotor lines regarding their seals. Baldor has replaced their old seals with new ones impregnated with friction modifiers, making them better at holding in oil. The change is proving beneficial for customers who install Baldor's gearmotors upside down or in a position where the oil rests directly on the seal.

While Baldor is updating their motors to keep liquids in, their latest release is focused on keeping them out. At Process Expo in September, they revealed a new and improved model for their washdown gearmotor line.

The new white washdown gearmotor is meant to replace the older model, which reached a far more limited market than Baldor had initially expected.

"What we ran into in the past is we'd actually sold white washdown gearmotors, but we primarily noticed that we were only selling to car washes," Tyler Lensing, product manager at Baldor, said. "And the reason for that was we had [a] finned extruded aluminum housing, so we decided that we needed a smooth body."

With fins on the housing, Baldor's gearmotor couldn't reach the food and beverage processing market that most washdown motors are designed for. Debris could settle and bacteria could grow between the fins, which would make keeping the gearmotors sanitary a difficult proposition.

Baldor's new white washdown gearmotor, however, returns with a round housing. The new product line mostly co-

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FEATURES

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opts features from the company's already established wash-down electric motors such as an o-ring between the in-plate and the stator band, neighboring gaskets where the conduit box meets the stator band and under the box lid, a threaded lead exit for sealing and a stainless steel seal washer on the shafts for both right angle and parallel shaft units. For Baldor, it's a good first step forward into a new industry, and it's a step that can always be iterated upon.

Lenze

OFFERING SMALL FORM FACTOR AND FLEXIBILITY

The latest from Lenze is their g350 gearmotor, which attaches their Smart Motor to a single-stage right angle gearbox with a minuscule form factor. Already an established product in Lenze's portfolio, the Smart Motor features multiple easy programming options, including five preset speeds and up to 20 seconds of programmed acceleration and deceleration. It also is capable of starting at 400 percent its normal torque, reducing the need to potentially oversize the motor. The g350 targets conveyor manufacturers with the main selling points of small form factor, flexibility and energy efficiency. Lenze has also optimized their marketing around the g350 to provide a simple portfolio of options to pick from. It comes in three sizes based on torque capacity, as well as options to come with or without brakes. In addition, plug-in shafts and bolt-on flanges are available for purchase.

But according to Alby King, electromechanical product manager at Lenze, drives, not gearmotors, are what's trending right now. King has noticed decentralized drives becoming increasingly prevalent in the market, and Lenze has started to receive customer requests for direct drives.

"Direct drive solutions often look as though they might take off and render gearboxes obsolete, but continue to be set back by lack of flexibility, size limits, complexity and cost," King said. "That said, they are coming down in cost and can offer advantages within certain markets."

SEW Eurodrive

EXPANDING PERMANENT MAGNET SOLUTIONS

SEW-Eurodrive's Movicgear line of permanent magnet gearmotors are perpetually being updated and expanded upon. Much like Siemens and Lenze, the company is targeting the conveyor industry. And according to Brian Lambert, electronic product manager at SEW-Eurodrive, trends such as internet shopping's prevalence and the expansion of shipping hubs will only feed the trend further.

And so SEW-Eurodrive is positioning its Movicgear line to capitalize on the trend. While the line has broad appeal for a number of industries, it's focused primarily on the food and beverage, parcel and airport handling and other conveying industries. The line features IE4 super premium efficiency, giving the gearmotor above-average efficiency, and a high torque overload capacity that reduces the need to oversize it.

The Movicgear line was most recently updated to include new customizable connector options and is currently undergoing development to "work seamlessly" with the Movi-

Line of inverters, another of SEW-Eurodrive's products. The Movic-C line features a modular design that combines software modules, controllers, inverters and drive technology. It's designed with customization and easy startup and monitoring/diagnostics in mind, and can run both synchronous and asynchronous motor solutions in both open or closed loop configurations.

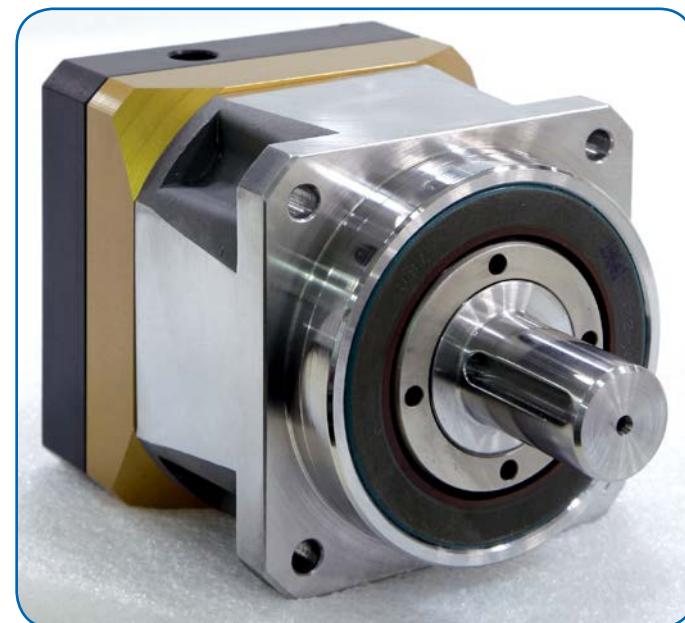
Parker Hannifin

MOVED AWAY FROM GEARMOTORS

Parker Hannifin has taken a long, hard look at customer feedback and their sales figures, and is opting to focus on gearheads and gearmotors as separate components.

Way back in 1998, when Parker Hannifin's gearhead division was still its own company called Bayside Controls, they released their first gearmotor to decent success. But despite the product's success, a majority of customers still wanted separate gearheads, citing ease and affordability of installation and replacement as more important buying factors than the smaller package a connected gearmotor provided.

"What we found was the majority of customers still want-



ed to buy a separate gearhead and a separate motor because we had made it so easy to mount a gearhead to the face of a motor," Jeff Nazzaro, gearhead and servo product manager at Parker Hannifin's Electromechanical and Drives Group in North America, said. "And the thought was 'well yeah, I know I'm not going to have as small an envelope, but when a gearhead is the mechanical wear component in a gearmotor, if I have a separate gearhead in the motor, I can just keep an extra gearhead on the shelf.'"

It was this "voice of the customer" that Parker Hannifin's gearmotor line needed to address. Gearmotors were always profitable, but gearheads were always better. And so a few years after acquiring Bayside, Parker Hannifin largely repurposed the group to focus on gearheads and motors separately.

"We found that the gearmotor had its tale of success, but the majority of the business still leaned towards a separate gearhead and a motor," Nazarro said. "Parker Hannifin still offers gearmotors as a custom product, with the flexibility to provide other modifications such as custom windings, coatings for special environments, shaft modifications, etc. Doing it in this manner makes more sense for us and the customer, versus having an extremely long list of options on a standard product."

Rexnord

"ALL ABOUT THE INTERNET OF THINGS"

For Rexnord's Power Transmission Division's VP of Marketing and Customer Care, Michael Miclot, the industry is "all about the Internet of Things."

Most notably, Rexnord has implemented an onboard intelligence for their V-Class family of gear drives that's connected to the Internet of Things. In plainer terms, the gear drive can not only connect to a wider system of machinery and controls, including PLCs, VFDs and interface devices, but it can also monitor its own condition, including temperature, vibration and oil quality/level as a form of preventive maintenance.

"Now you've actually got an intelligent device connected into your infrastructure that can set alarms and allow the user to prevent unplanned downtime," Miclot said.

For example, the V-Class gear drive can replace oil sample tests by constantly monitoring its own oil levels and quality. Whenever quality begins to dip below accepted levels, the drive can notify the end user of the situation, often giving maintenance crew far more time to plan and execute maintenance without disrupting workflow than if the device had failed.

"We're not talking you've got pending catastrophic failure within minutes," Miclot said. "You've often got days to respond to this."

As a large gear drive designed for bulk material handling, the V-Class is primarily focused on only industries like mining and oil/gas. Implementing universally useful features on such a focused product first may raise a few brows when Rexnord had other lines they could have chosen as a

first candidate, but Miclot believes that these industries are where these features shine best. Most notably, gearmotors in mining and oil/gas applications can often have a decades-spanning lifetime, but regularly require maintenance to remain operational, which makes downtime a major issue for end users in these fields. Preventive maintenance can go a long way to alleviating that issue by reducing the strain on maintenance crews and improving uptime.

While the V-Class is somewhat limited in the markets it can reach, Rexnord will doubtless be rolling IoT functionality across more gearmotor lines in the months to come. And what has seen more widespread implementation is a QR code system that Rexnord has updated their entire portfolio of geared products with.

With a single scan of the QR code with a phone, end users can view everything from installation and troubleshooting instructions for their specific product to the warranty status on your specific gearmotor. Most importantly, the QR code only produces information directly relevant for the product it's attached to. It does all the website searching for you.

QR codes also allow end users to set maintenance schedules for their gearmotors. Rexnord allows customers to sign up for maintenance reminders with a flexible system that allows the end user to input their preferred schedules and can accommodate for multiple schedules for different gearmotors.

Between both products, Rexnord is positioning themselves alongside numerous other companies to capitalize on the Internet of Things' ever-increasing prevalence, taking advantage of the numerous ways the new field of technology allows them to push old metrics to new heights.

Framo Morat

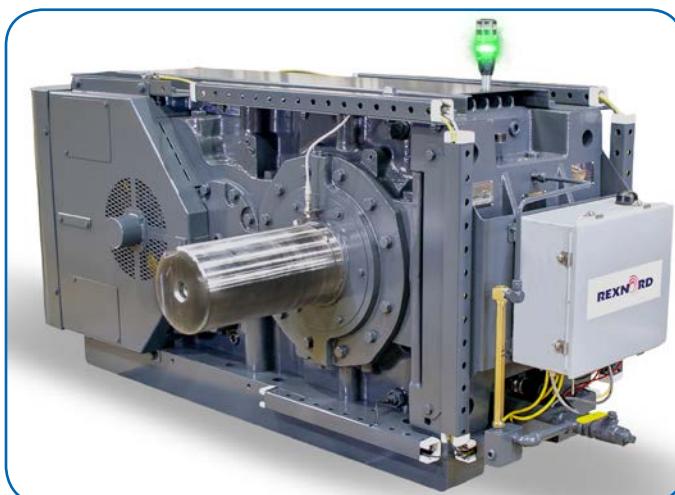
DESIGNING FOR SPACE-CRITICAL APPLICATIONS

Framo Morat has recently come out with new hub-type planetary gearboxes laser-focused to fill space-critical applications that also feature high radial loads. To accomplish this, Framo Morat has made their gearbox as compact as possible. They've also managed to design the gearboxes to have solid bearing support without relying on tapered roller bearings in a bid towards cost-effectiveness.

The new gearboxes are designed with AGVs and warehouse shuttle drives integrated in wheel hubs or as timing belt drives in particular. That might sound like an incredibly narrow focus almost more worthy of custom designs upon customer request instead of a regular line of gearboxes, but according to Wolfgang Sühling, head of development at Framo Morat, it's worth it.

"Thanks to e-commerce, the automatic warehouse industry generates a rapidly growing demand for compact wheel drives with high radial loads," Sühling said. "The quantities justify tailored designs based on standard components which allows us to offer superior cost, size and load performance."

Sühling believes online shopping will continue to grow, and in doing so, the industry will drive the production of AGVs up. And when it does, Framo Morat will already be in position to capitalize on it. **PTE**



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Escaping Orbit: Orbitless Drives Develop New Alternative to Planetary Gearboxes

Though not directly involved with the purchasing of gearmotors, something your gearmotor manufacturer in turn might be looking at in the future is the Orbitless Drive, a new gearhead design being licensed by Orbitless Drives.

The Orbitless design is the brainchild of Leo Stocco, CTO of Orbitless Drives and robotics expert. The gearhead is a modified take on the standard planetary gearset. Namely, the design calls for removing the ring gear and replacing it with a second carrier attached to the planet gears with a second shaft.

The Orbitless gearhead is designed to be a general purpose tool with benefits across numerous industries from medical to aerospace to automotive and to work with all sizes of motors. As Orbitless Drives' CEO, Robert Eisses, put it, it's not designed to be a product. It's a platform.

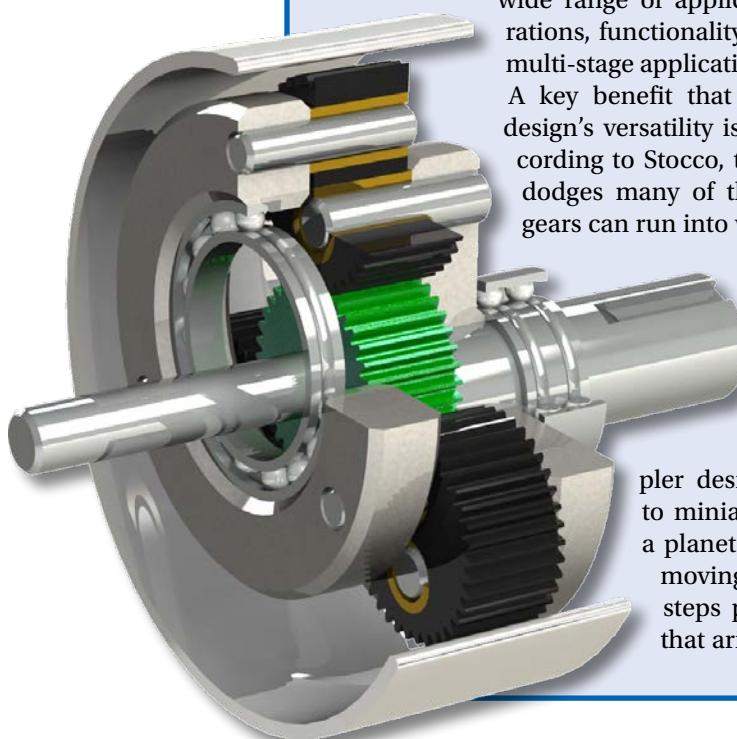
"If you look at our customer base, they deal in multiple markets," Eisses said. "So anywhere from automotive to aeronautical to medical devices to industrial to consumer products; each of them have a different angle in terms of how they're addressing that market, whether it's cost or precision or whatever, and our technology applies to all of them to make their specific products in each of those markets better."

The laundry list of improvements over a standard planetary gearset is impressive: lower backlash, less friction, higher efficiency, lower pitch velocity, lower bearing velocity, relaxed assembly criteria, simpler construction, a

wide range of applicable ratio configurations, functionality in both single and multi-stage applications and more.

A key benefit that contributes to the design's versatility is its resizability. According to Stocco, the Orbitless design dodges many of the issues planetary gears can run into when resizing, making it much easier to repurpose for different sized applications than planetary designs. The Orbit-

less gearhead's simpler design makes it easier to miniaturize compared to a planetary gearset, and removing the ring gear sidesteps potential difficulties that arise from the need to



have such a large gear around the full set when the design is upscaled. And an additional option the Orbitless gear design supports over a planetary gearset is plastic gearing, particularly during resizing.

"The problem is when you make a ring [gear] small, it's very thin and it easily deforms," Stocco said. "Well when it deforms, the efficiency suffers dramatically. So if you make everything out of plastic, it's hard to maintain the efficiency in a planetary gear where you can make the case and everything of an Orbitless out of plastic because they only have pinions which don't deform so much."

But because of the similarity in design, while an Orbitless gearhead may be less complicated than a planetary, it carries many of the same fundamental design principles. Many of the advances the industry has made in planetary gearing also apply to the Orbitless design, and much of the expertise a manufacturer may have built up designing planetary gearsets is still applicable when working with this new gear design.

"Because the parts are fundamentally equivalent to what's been done for such a long time, you get to leverage all the advancements that have been made in tooth geometry and all the things that are being done in a planetary to make it more efficient," Stocco said. "Well you don't have to throw that away and start all over because it's not so far different. You can use most of those techniques."

In addition, the Orbitless gearhead design offers various benefits that would be appealing for different applications on both ends of the size spectrum.

According to Stocco, the Orbitless design is easy to manufacture, as well, requiring less expertise than a full planetary gearset.

"Anyone that is capable of manufacturing a planetary gear, it's actually easier...the technology behind internal gears is unnecessary and everything else you're already doing is all you need to do to implement it," Stocco said.

And the goal for Orbitless is to get others to implement it. Rather than selling their own gearheads to end customers to attach onto an individual motor, they're marketing them to gear and gearmotor manufacturers as a licensed component for the complete package before it goes to market. And to meet that end, the company has made sure their product is both simple and malleable in its implementation. The ways an Orbitless Drive can be utilized are as numerous and varied as the planetary design it's derived from, with each configuration having

its own strengths to shine in specific industries or applications.

Considering the newness of the design, Stocco also believes that there may be additional, unexplored configurations as well, but any new possibilities Orbitless technology could open are only just starting to be explored. The patent pending Orbitless Drive was conceived only a few years ago, and the company only started working with customers in the past year to validate its efficiency and other properties. Its exact place in the industry has yet to be seen, as does how widespread the technology will become.

But whether the Orbitless Drive becomes a mainstay addition to the gearmotor manufacturer's toolbox or a more specialized one, it remains a new and exciting tool in an industry that hasn't seen an attempted reinvention of the wheel in some time.

Eisses, however, believes that Orbitless Drives' design is in step with the times and will lend itself well to the ever-growing robotics and automation industries, which are always hungry for efficient, compact and portable designs, and the direction automotive is going around eMobility, which will require more efficient and quieter gears than ever. Stocco, who has a background in robotics himself, has also experienced more enthusiasm than he initially expected in the industry.

"The gear experts that we've been talking to have been surprisingly open-minded about accepting something that really changes the way that they potentially can operate," Stocco said. "Up until now, there's been two options that you compare between when you're deciding how to implement a gear, and now we're showing up with a third one. I was expecting more resistance than we've gotten from it. People were really quite excited to have a new tool in their toolbox in order to try to solve the problems that they get day to day."

And if that enthusiasm is anything to measure by, you might want to keep an eye on the Orbitless gearhead's progress in the industry — you may very well see it in a future gearmotor you purchase! **PTE**

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