

Taking Aim at Conveyor Systems

Gearmotor manufacturers are finding new ways to appeal to the conveyor systems market.

Alex Cannella, News Editor

It's no secret that conveyor systems are the primary market for gearmotors, and so it shouldn't be much of a surprise that gearmotor manufacturers are looking for ways to cater to that market's needs. From Brother's new VFDs to Siemens' Simotics S-1FG1, a lot of the new solutions in the industry have their own unique quirks, but all fall into a few common veins.

Unsurprisingly, one of the main focuses is efficiency. Between tightening mandates and the European race for ever more efficient motors, energy efficiency has been a buzzword for a few years now.

What is a bit of a shock, however, is that premium (IE3) motors are still not the de facto standard. Back in June, the DOE again expanded the range of motors now required to be at a minimum premium efficiency. One might expect that in the wake of the most recent rules change (which is the latest of a long line of tightening efficiency restrictions on the industry), premium motors would have become old hat, the new standard everyone expects. But four months later, gearmotor manufacturers are still running into customers that never got the memo and premium efficiency is still an important selling point, not the baseline expectation, even though in many cases, it's the lowest efficiency legally available on the market now. The most recent mandate has been in effect for some time now, but it's still very much an issue affecting the industry.

"Sometimes people that are in the market, we just take it for granted that everybody knows about it," Matthew Roberson, senior director of

Brother's gearmotor division, said. "And quite honestly, they don't... There still seems to be an educational gap between the regulations and what they mean to equipment manufacturers."

"A lot of our customers heard something about them launching [the new law], but they weren't really sure how it affected them," Tom Koren, Nord's engineering manager, said. "So we have to go out and educate our customers on what changes we have to make and how it's going to affect their product."

Many manufacturers are still working to get all their customers onboard and overhaul their inventories. Some of the industry's newest innovations are also focused on delivering higher efficiencies without adding weight or size to the motor, and even outside the new law, full system efficiency is becoming an increasing focus.

Another common theme is standardization. A common issue many gearmotor manufacturers are trying to address is the laundry list of different gearmotors many end users have built into their systems. Currently, many of these gearmotors aren't quite redundant, but they all have slight variations required based on multiple required speeds, sizes or configurations, which leads to a bloated inventory of numerous, slightly different gearmotors all built into a single system. Gearmotor manufacturers are focusing on making more versatile products that can cut down on the number of different gearmotors required to make a given system run. Having more one-size-fits-all gearmotors simplifies the task of finding the right tools for the job and, more importantly, makes maintenance and upkeep easier.

Brother Gearmotors: Bringing Expertise to the Subfractional Market

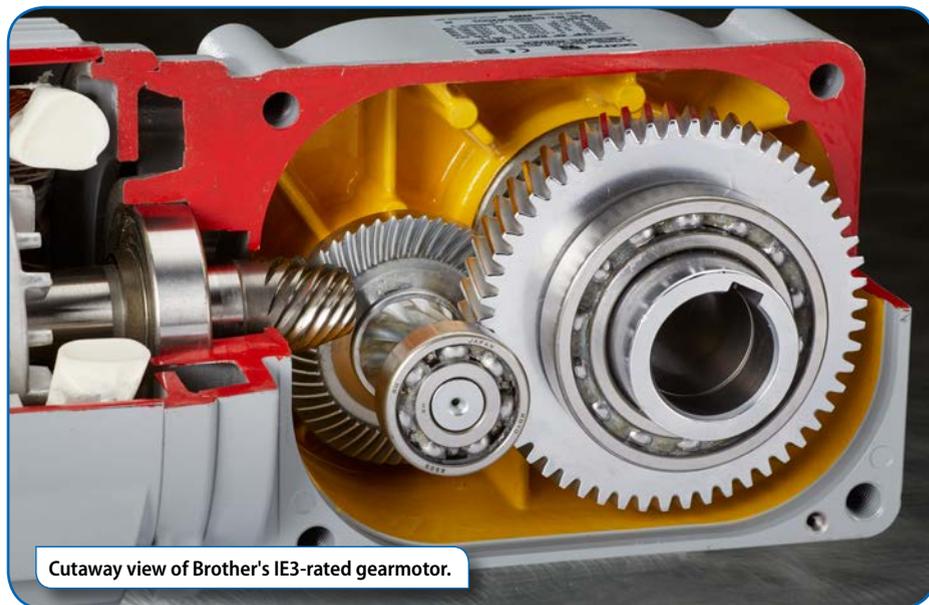
The newest product Brother Gearmotors released just this month stems from a recent partnership between Brother and American Control Electronics (ACE), Variable-Frequency Drives that are specifically designed for use with subfractional motors.

The VFDs' main selling point (beyond their compatibility with subfractional motors) is their speed control, which allows OEMs to use three-phase motors where normally only single phase power is available and offer higher starting torque and running efficiency. Other control features include injection braking, acceleration and deceleration control, a torque limiter, motor overload protection and overheat protection.

ACE's VFDs target a currently underserved industry. According to Roberson, subfractional motor OEMs don't have many options for finding a VFD, and so they often resort to using an oversized VFD, which means reduced efficiency, a larger end product and other headaches.

"What we've found here is that there are a lot of people who need electronic control on small horsepower, but there's not a lot of VFDs on the market for those subfractionals," Roberson said. "So what they actually do, is they oversize it. They're buying VFDs that are really for 1-3 hp and using them on subfractionals and they're just not a match optimally...With our product, it's more optimized in design for just that specific subfractional product."

Brother has also recently introduced their own IE3 premium motor line. On top of meeting premium efficiency requirements, many of Brother's company-wide features can be found in their premium motors. According to Roberson, their production method,



Cutaway view of Brother's IE3-rated gearmotor.

which they execute from start to finish, is part of what sets Brother's gearmotors apart.

"We've got five factories in Japan, and raw materials come into these factories and gearmotors come out. And there's not a lot of companies that do this. That means we wind all of our own gearmotors, we stamp all of our own laminates, we make all of our own shafting and gearing, we do all of our own heat treat, we do all of our own die casting, we do all of our machine work, we do all of our own electrostatic painting."

Another advantage of Brother's gearmotors is that they're all lubricated with grease instead of oil. This allows the gearmotor to forgo installing any breathers, which oil-lubricated gearmotors need to allow heat to escape the machine. This, in turn, allows Brother's gearmotors to be universally mounted and lets the end user trim down on the number of different gearmotors they need to buy.

"Let's say you're an OEM and you have a gearbox on the right side of the conveyor, and the same gearbox on the left side of the conveyor," Roberson said. "If you're using someone else with oil, you're probably buying two different gearboxes, and your inventories would be doubled. With our universal mount, you can have one gearbox that would flip, and customers really like that."

Lenze: Standardizing Conveyor Systems

Headlining Lenze's latest products is their g500 gearbox, and according to Alby King, Lenze's electromechanical product manager, this one's a doozy.

"On the gearing side, the g500 is easily the biggest thing Lenze has done in its entire history," King said.

The g500's primary feature is its motor input interface. The interface between different motors and the g500 is the same size, making it possible to easily mix and match different models. As a bonus, having a one-size-fits-all interface removes the need for an adapter plate. This, in turn, trickles down further benefits, such as a lower oil temperature and improved sealing properties. Without an adapter plate, the g500 only has an o-ring sealing the

connection between motor and gearbox, which is actually an improvement over the gasket and plate, and with the adapter plate out of the way, Lenze's motors blow air on the gearbox, lowering the temperature of the oil enough for end users to see up to a 50 percent increase in lubrication longevity.

"It's not very many degrees, but it makes a big difference," King said.

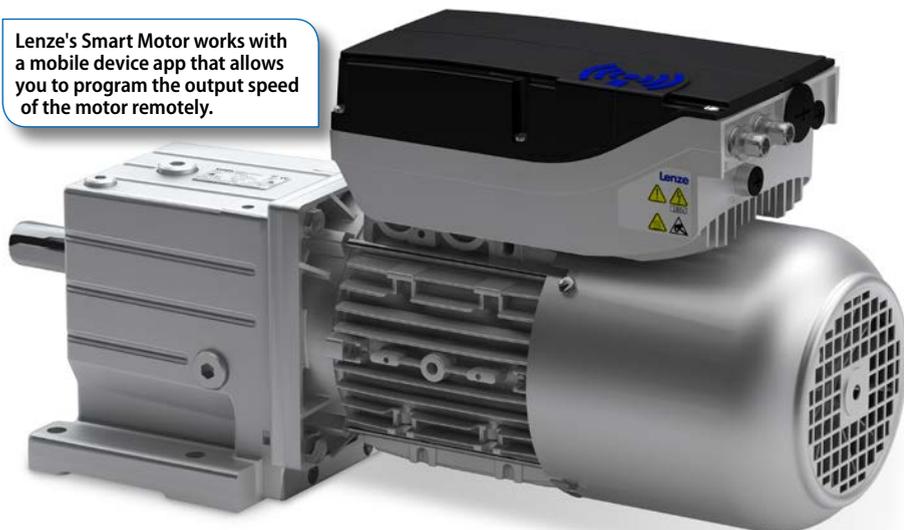
Another big product to recently come out of Lenze is the Smart Motor, a motor that's set up to work with a phone app that can program the output speed of the motor. The product mainly targets conveyor systems, allowing them to cut down on the number of motors they need to have on hand and standardize their system.

"Conveyor beltters purchase multiple gearmotor configurations to accommodate multiple payloads and velocities," King said. "What the Smart Motor does is it allows you to reduce the number of different configurations due to the fact that you can program the output speed with a phone."

The Smart Motor has five different configurable speeds (including a reverse) and works at speeds ranging from 500 to 2,600 rpm.

The g500 and Smart Motor are also compatible with each other, combining as a single package to deliver quality system efficiency. Together, the Smart Motor and g500 set themselves up as a versatile product that can fulfill a broad range of conveyor applications, eliminating the need for multiple motor configurations and standardizing conveyor systems while providing

Lenze's Smart Motor works with a mobile device app that allows you to program the output speed of the motor remotely.



energy efficiency concurrent with the latest energy mandates.

“You can take a dozen different gearmotors and bring it down to two in the end,” King said.

Nord: Doubling Down on System Efficiency

While companies such as Brother might deliver on full system efficiency options, Nord doubles down on it and has made the topic their entire focus. They’re all about providing the highest system efficiency possible to ensure the customer gets the most out of their energy savings.

“The industry’s been pushed into these premium efficiency motors by government regulation,” Koren said. “And then they still allow you to bolt that premium efficiency motor onto a 50, 60, or 70 percent efficiency worm gear. And it just doesn’t make sense. What Nord’s invested all their energy and time and money in is really making complete optimized selections. We don’t look at motors. We don’t look at gearboxes. We look at gearmotors. We look at them as a system and developing the most energy efficient system that we can provide, including the control.”

Full system efficiency is currently a bit of a blind spot in the motor industry as a whole. While motors themselves are growing more efficient every year even beyond tightening regulations, many of the products they get bolted to have little to no regulation on their energy efficiency, and you start running into situations where hyper-efficient motors are somewhat squandered because they’re attached to inefficient products that essentially drag down the team.

The DOE is currently making the rounds and looking at some of the larger systems motors are used in (such as pumps, for a recent example) and setting new energy standards, but with so many different systems to look at, it’s like playing a game of whack-a-mole, and there’s no telling how many different systems the DOE will ultimately shine a light on or how long it will take. While motor efficiency has seen a massive push in the last decade, full system efficiency is lagging behind in both quality and awareness. Nord is one of

the few companies actively focusing on reversing that trend, focusing on superior energy efficiency across the board as opposed to pushing the limits of motor efficiency with IE5 motors.

A primary example of this is their 92.1 two-stage helical bevel gearbox, which features an average efficiency of 97 percent. The 92.1 also boasts a 70:1 gear ratio, another trait that, according to Koren, sets Nord’s products apart from the competition.

“Nord Gear cuts pinion gears on our motor shafts, which allows us to get up to roughly a 70:1 gear ratio in a two-stage product,” Koren said. “So what this product can often do is replace worm gears that maybe operate at 50, 60, 70 percent efficiency. We can replace something in approximately the same footprint that operates at 97 percent efficiency.”

It’s important to highlight that Nord’s method not only allows for high system efficiency, but also does it without making the gearmotor larger. Usually, in order to improve efficiency (most commonly by just putting more copper into the motor), a manufacturer makes the motor larger and/or heavier in the process, but Nord’s process allows them to minimize that increase in size.

Running in a similar vein, the 92.1 also features large bore and shaft capacity, which prevents OEMs from having to use oversized gearmotors to accomplish tasks. The 92.1 has high overhung capacity load and its housing is machined using the Unicas one-piece housing design.

In general, Nord’s solutions also have some benefits when it comes to standardization. Due to the aforementioned pinion gears cut directly on the motor shaft, Nord is able to homogenize their line of motors without losing efficiency or power. Nord only manufactures 4-pole gearmotors, but according to Koren, their gearmotors can also reach the same output speeds as other companies’ 6-pole motors would, which trims down on the number of different models end users need to order to make their system run.

“You have different motors at different speeds, and the programming for those motors is different,” Koren said. “It creates a lot of headaches for people in the

industry to have different motors just to get different output speeds on a gearbox. Nord’s 1 hp motor is always a 1,800 rpm base speed 4-pole motor, no matter what output speed you’re buying.”

Nord has also made a recent push into large industrial motors with the Maxxdrive, a large gearbox that can be assembled as either a right angle bevel or parallel shaft and can support loads up to 2.2 million lb-in of torque and reach up to almost 1,300 hp. It’s a new market for Nord, but according to Koren, they’re seeing active interest in the Maxxdrive.

“We’re not known for that product,” Koren said. “Nord is known as being one of the global leaders in the small gearmotor business. We’re working to develop our reputation and name in the large industrial gear market. It’s going well for us.”

Siemens: Servicing the Industry with Servomotors

The newest gearmotor to come from Siemens is the Simotics S-1FG1, a permanent magnet servo gearmotor, which Siemens has designed to work with their S120 drives. The 1FG1 offers a number of features, including multiple gearbox options (helical, parallel shaft, bevel and helical worm) to meet different applications. Siemens’ article also features up to 25 different gear ratios.



According to Summervill, however, the 1FG1's distinguishing feature is that its encoder is decoupled from the output shaft. With this setup, the encoder endures fewer vibrations and less heat, two primary causes of encoder failure, thus improving its lifespan. But even if the encoder fails, having it decoupled from the output shaft allows maintenance staff to swap it out for a new one, as opposed to having to send it back to the manufacturer to repair.

The removal process is simple and can be done in minutes as opposed to the days shipping the motor to the manufacturer could take. Just unbolt the failed encoder, take it out and replace it with the new one, which can slot directly into a keyway.

"It's just like a key in a car," Summervill said.

The 1FG1 also forgoes putting an adapter plate between the gearbox and motor, instead using a plug on pinion. This reduces the length and weight of the servomotor.

Summervill has noticed a growing trend of customers moving towards servomotors that has been fed by many of the same advantages highlighted in the 1FG1. Products such as the 1FG1 speak to those always looking for ways to save money and improve productivity, as it not only saves space and time, but also offers potential energy savings, all of which can lower the

cost of operation. According to Summervill, servomotors are generally a little more efficient than premium motors. While they're not as efficient as Siemens' standard super premium/IE4 motor offerings (which you could, of course, add a gearbox to yourself), they still do offer a slight edge over current standard offerings, and that edge still means saving on the energy bill.

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Nord Drivesystems
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Siemens Simotics S-1FG1 servo gearmotors feature an encoder that's decoupled from the output shaft, providing for longer life.



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