Sulzer

EXAMINES ELECTRIC MOTOR EFFICIENCY IN PUMP APPLICATIONS

Electric motors in industrial applications, including those used in pumping systems, consume 30 to 40 percent of the world's electricity. For the past two decades, equipment manufacturers, users and regulators have been tackling excessive energy consumption. This has led to the development of higher efficiency standards for motors and the adoption of variable speed drive (VSD) technologies to better match energy use and demand.

For motors designed for running in continuous duty applications (S1 operation), the International Electrotechnical Commission standard IEC-60034-30:2014 defines minimum energy efficiency specifications for four classes of motors: IE1, Standard Efficiency; IE2 High Efficiency, IE3 Premium Efficiency and IE4 Super Premium Efficiency. Each step up the IE efficiency ladder is associated with around a 20 percent reduction in motor losses, which translates directly into significant operating cost-savings.

The 2014 update also includes 8-pole motors and has widened the rated power band to include 0.12 kW up to 1'000 kW motors. US NEMA efficiency standards use an almost identical approach. In Europe, the IE3 standard has been mandatory for new industrial motors rated between 0.75 kW and 375 kW since 2017.

The European Commission estimates that the current efficiency regulations have reduced annual energy consumption by 57 TWh across the continent. The rules will be further extended in 2021 to cover both smaller and larger motors, a change that is expected to double the energy savings figure by 2030.[1]

Adjusting the focus of efficiency

So far, however, submersible pumps used in water and wastewater applications have been excluded from the efficiency regulations. In the main, that's because IEC-60034 standards require motors to be tested "bare" without seals, couplings or other system components. For machines with integrated motors and elaborate sealing systems, the calculations are a little more complicated as these losses need to be become part of the hydraulics.

Putting the regulations aside, commercial pressure to improve submersible pump efficiency has also been limited. The savings delivered by efficient motors are directly proportional to the duty-cycle of a motor. The biggest savings accrue from motors that operate continuously throughout the year. As a result, equipment owners have tended to focus their energy-efficiency investments on continuous-duty applications, rather than wastewater pumps which typically run for around 850–2000 hours, or approximately 10-25 percent of the time.

Sulzer believes that the case for premium motor efficiency in submersible wastewater pumps is stronger than either the regulators, or some users, currently recognize. That's why the company offers IE3 Premium Efficiency motor designs as the first choice in its complete range of submersible wastewater pumps.

Reducing operation and maintenance costs

Looking at the overall life cycle costs (LCC) for a pump over a 15-year period, energy costs represent the largest proportion at around 65%, with operation and maintenance accounting for 15%. The initial cost of the pump itself is only around 10% of the total, highlighting the importance of energy efficiency when it comes to long-term expenditure. The remaining 10% includes installation and decommissioning costs as well as downtime and environmental expenses.

In the case of wastewater pumps, there is an additional factor that needs to be considered. The pump needs to be designed to minimize the number of blockages that are experienced. A study by Water UK found that wipes made up around 93% of the material causing sewer blockages.

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Assuming a pump becomes blocked every second month, operational costs to clear the system and expenses for any repairs, consumables and replacement parts, including labor, will represent 15% of the LCC; this can be reduced to less than 5% if the latest design of wastewater impeller is implemented, keeping blockages to a minimum.

Pump operators should therefore focus on two important points. Firstly, selecting new pumps that offer the latest design principles and have been tested for hydraulic performance under real-world conditions. Secondly, they need to focus on overall pump efficiency, which is a combination of motor design and hydraulic efficiency.

The impact of IE3 motors on energy costs

Selecting an IE3 motor and an impeller designed using computational fluid dynamics (CFD), can reduce LCC by EUR 12'000 compared to a low efficiency pump (assuming 15 years of operation of a typical 37 kW pump).

A second, and equally important benefit of higher efficiency, is greater reliability and a longer operating life. Energy is wasted by motors as heat, and in an enclosed submersible pump application, excess heat can dramatically shorten the life of key components such as wiring, bearings and seals. The improved efficiency of an IE3 motor equates to a lower operating temperature, which translates directly to a longer lifetime for all pump components, reducing the need for maintenance interventions.

In addition, motor wiring insulation is specified to give a minimum operating lifetime of 20'000 hours at a given temperature. As a rule of thumb, the lifetime of the insulation doubles for every 10°C (18°F) drop in operating temperature. The Class H insulation used in Sulzer motors is designed for a maximum winding temperature of 180°C (356°F). With actual operating temperatures of these high efficiency motors much closer to 105°C (220°F), the wiring has an expected lifetime of 320'000 hours. In lab conditions, some Sulzer pumps are reaching a theoretical life of a million hours before the motor windings fail.

For all these reasons, efficient motors are just one part of a holistic approach to pump performance and reliability improvement at Sulzer. Other key components of that approach include the use of advanced CFD to optimize performance and the innovative Contrablock Plus impeller design that resists clogging and allows easy wear compensation. Together, these changes can cut the lifecycle costs of an installation by more than half compared to less sophisticated designs.

www.sulzer.com

Regal Beloit

INTRODUCES QR CODES ON MOUNTING BEARING PRODUCTS

Regal Beloit Corporation has announced it is now putting QR codes on Sealmaster and Browning mounted bearings products and bearing boxes including Browining, McGill, Rollway, Sealmaster and System Plast.

Regal customers can use any smartphone to scan this simple, yet effective QR code to gain access to the landing page on regalbeloit.com, which provides:

- Information on how to register Regal bearing products
- Access to product specifications, including all critical dimensions and features, and the Regal 2D and 3D CAD libraries
- Installation and maintenance instructions
- Information on where to buy Regal products Instructions on how to download the Regal Power Transmission mobile app

"This is a natural progression of our goal to leverage digital technology to make it easier for Regal customers to quickly find information and improve transactions with our company," said Ian Rubin, director of marketing—customer experience, Regal. "The Regal Power Transmission Solutions group will expand this effort beyond bearings, working to deploy QR codes on other products. More information on that is to come."

www.regalbeloit.com

U.S. Tsubaki

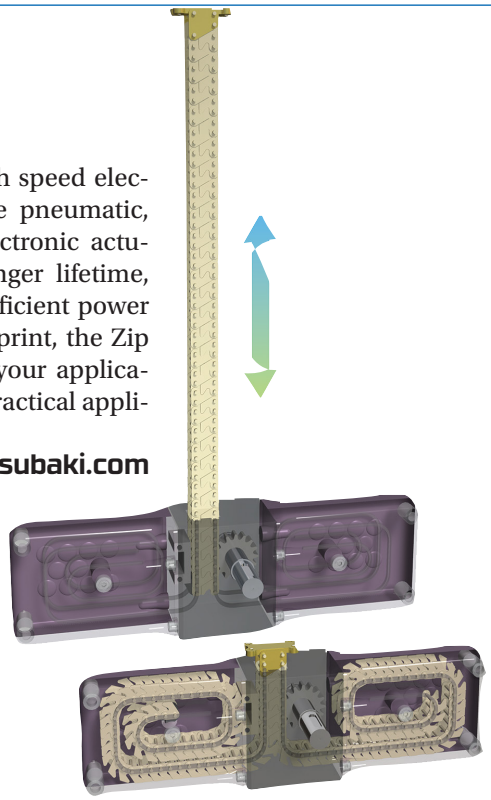
INTRODUCES ZIP CHAIN ACTUATOR

U.S. Tsubaki Power Transmission, LLC is pleased to announce the launch of the Zip Chain Actuator. The Tsubaki Zip Chain Actuator is an electric linear actuator that provides high speeds and multi-point stopping in a compact footprint.

The Tsubaki Zip Chain Actuator is a linear actuator that "zips" together specially segmented chain using a custom designed sprocket. This "zipping" action creates a rigid actuating arm for use in push-pull applications that require high speeds, long lifetimes, small footprints, and/or high precision.

Up to now, engineers have been limited to using pneumatic/hydraulic cylinders, or large, bulky screw-style electrical actuators. Tsubaki offers a compact, high speed electric actuator that can replace pneumatic, hydraulic, and traditional electronic actuators. With higher speed, longer lifetime, multi-stop positioning, and efficient power transfer, all in a compact footprint, the Zip Chain Actuator can upgrade your application and make previously impractical applications possible.

www.ustsubaki.com



Nexen

SENSOR OPTIONS ENHANCE CONNECTIVITY TO BRAKE FAMILIES

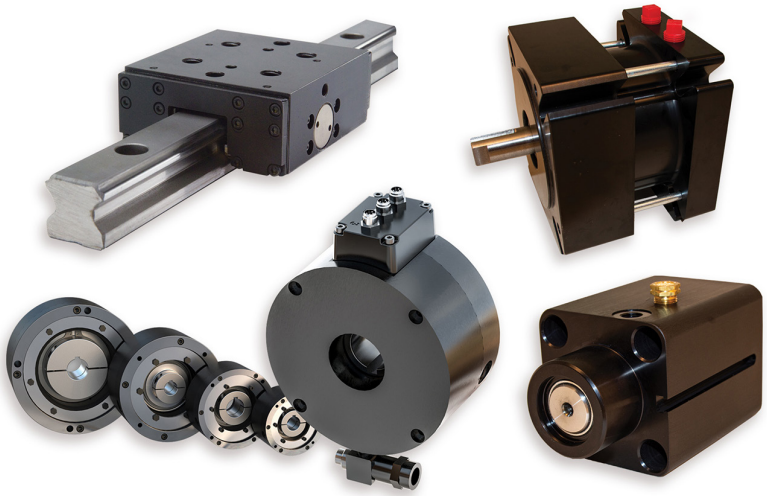
Nexen Group, Nexen Servo, Rail, and ZSE brake lines now have Industry 4.0 connectivity sensor options to enhance machine efficiency. Multiple sensors integrated into the brake families provide information about brake operation and health to the control system network.

The sensors used in the spring operated, air released ZSE brakes provide operation information such as brake engagement/disengagement and temperature. Information provided by the sensors is shared with the control network to aid in motor/drive programming, avoid brake overheating, and extend brake life. ZSE flange mounted, through bore, spring engaged brakes provide true zero backlash, low inertia, and high rigidity for precision holding applications. Rated for more than 2,000,000 holding cycles.

Nexen Rail brakes equipped with magneto-resistive sensors are used to sense brake engagement and disengagement. Industry 4.0 Connectivity to the control network aides in accurate linear positioning, predictive maintenance, and operational feedback. The engagement sensor is activated when the pistons and facing pair move out of the disengaged position and the facings transmit force to the rail. The disengagement sensor is activated when the rated air pressure is applied and the piston facing pair move to a disengaged position. Nexen's RB Series of linear profile guide rail brakes uses spring force to secure the load in holding applications. These profile rail brakes hold position accurately by reducing drive train backlash and elasticity.

Similarly, the Servomotor brake can be equipped with three inductive proximity sensors used to monitor disengagement, engagement, and wear. Using IO-Link v1.0 fieldbus connectivity, data can be shared within the control network to aid in motor/drive programming, predictive maintenance, and operational feedback. The disengagement and engagement sensors activate in a similar manner to the rail brake. The wear sensor activates when the brake is engaged and the facing is worn to a point that it needs to be replaced. Spring engaged, air released servo motor brakes mount to the shaft end of servo motors up to 20 horsepower. The brake acts as an adapter between dissimilar mounting features. The brake bore accepts the motor shaft that is fixed inside the brake with a split hub/shaft collar. This brake is a high-torque, zero backlash device.

www.nexengroup.com



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Voith Turbo

INSTALLS FIRST VORECONNX VARIABLE SPEED DRIVE

Voith Turbo has successfully installed and commissioned the first VoreconNX variable speed drive for a U.S. customer, which began using it for its production needs on November 30, 2020. As a next-generation modular variable speed drive that combines a hydrodynamic power transmission with a planetary gear, the VoreconNX delivers low-range power up to 10 megawatts and is particularly well-suited to operate compressors in the power, oil & gas industries.

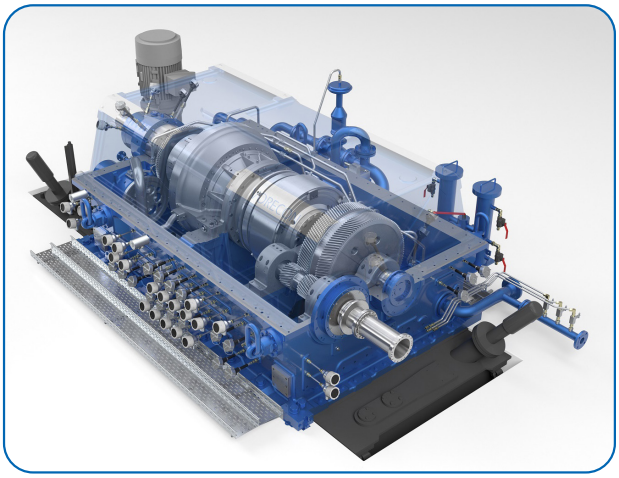
"The customer was very happy with the performance results from the unit's commissioning. They clearly see a lot of potential with VoreconNX, having ordered three units in total, due in part to their ease of maintenance that comes from a standardized design and allows part swapping between units," said Brinnet Paul, senior account manager, Voith Turbo North America.

Prior to delivery, installation and final commissioning at its new home in Louisiana, the VoreconNX unit was tested at Voith's Crailsheim, Germany, factory where it ran through a series of standardized performance tests including a speed ramping, overspeed protection and defined-load point tests. With the installation complete and the VoreconNX unit in operation, the owner expects to operate the unit for the next five years without shutdown. At that point, it will be taken offline for a routine inspection and maintenance.

"The entire installation and commissioning process went very smoothly despite the area being hit by three hurricanes this year," added Craig Aggen, senior field service technician, Voith Turbo North America, who also noted the drive not only passed a rigorous test on Voith's test stand but also an informal vibration test at the site. "We gave it the 'Coin Test.' This is where we balance a nickel on its edge on top of the VoreconNX and see if it stays or falls due to vibration. It stayed!"

Voith Turbo North America currently has several other VoreconNX units that have been ordered for use in the U.S. and Canada, with deliveries and commissioning activities coming up in the next two years.

"The units built for the North American market are going to be tested in a lot of varying conditions — from Canada to the Gulf of Mexico — and our customers are very excited to get this next-generation power transmission technology added into their production processes. Once installed, the VoreconNX will boost their operational efficiencies through adjustable pump guide vanes, which offer an improvement of up to eight percent at part load," said Peter Goretzki, product manager, Voith Turbo. "Beyond its efficiency improvements, ease of maintenance and small footprint, our testing also is showing another key value of the VoreconNX — we're predicting a mean time between failures of 48 years in long-term operation. That's a phenomenal number for an industry that values reliable operation."



voith.com/VoreconNX

NORD

OFFERS VERSATILE DRIVE SOLUTIONS FOR BAKING INDUSTRY

NORD DRIVESYSTEMS offers efficient and hygienic drive solutions for the baking industry, meeting their special requirements for hygiene, reliability, and robustness. This includes agitators, conveyor systems, weighing and filling plants, packaging machinery, and more. NORD's variable frequency drive technology guarantees high positioning accuracy and safe implementation of dynamic sequences. The drive units can also be controlled individually, for example, they can regulate kneading and conveyer speeds in order to prevent blockages or control the dough process. Due to their modular structure, NORD drive units are also service and maintenance friendly. For the baking industry, addition of the nsd tupH sealed surface conversion treatment provides an outstanding anti-corrosion treatment for gear units, smooth surface motors, variable frequency drives, and motor starters with cast aluminum housings for extra protection in washdown environments. The fan-less smooth surface motors do not spread germs and operate with very low noise.

CLINCHER Parallel Shaft Gear Units and the UNICASE Helical Bevel Gear Units are ideally suited for the demands of mixing and agitating applications. They boast torque capacities of 638,000 lb-in and 442,000 lb-in respectively along with extensive input designs and mounting options. They can also be supplied with food-grade mineral or synthetic oil and bearing lubricants as well as a variety of gearbox and motor washdown protection options. These products are extremely low maintenance with long service life. When combined with NORD drive electronics, you have a complete, reliable package from a single source.

NORD DRIVESYSTEMS offers application-specific equipment options that combine high performance and efficiency without the need for costly custom components. Each drive unit is specifically configured for the application it will be used for, such as agitators and mixers with high process-related radial and axial bearing loads. This includes an agitator version (VL2) with increased bearing distance and reinforced output shaft bearing, as well as a Drywell version (VL3) with additional oil slinger, dry cavity, and oil leak detection port.

Additionally, within NORD's paint portfolio, NSDF3 and NSDF3+ food duty paint is typically used for food production and packaging areas. This makes it the perfect solution for the bakery industry due to its compliance with environmental regulations and corrosion prevention. The paint systems used by NORD DRIVESYSTEMS are resistant to chemicals and have been tested for their resistance to all common substances which could have a negative effect on the environment. NORD paints are food-safe while being USDA and NSF compliant.

www.nord.com

NORD offers application-specific options for the baking industry.

Polygon

OFFERS DOUBLE INSULATION DIELECTRIC COMPOSITE TUBING FOR ELECTRIC MOTORS

Polygon Company highlights its Double Insulation Dielectric Composite Tubing for electric motor applications. Polygon Tube double insulation tubing is customizable to an individual application's needs, thus ensuring the highest possible quality and greatest safety benefit in each individual motor design.

Used as a sleeve within the armatures of electric motors, Polygon Tube double insulation tubing acts as a secondary layer of insulation and provides shock protection to the operators of electrical tools and appliances. The use of the additional layer of insulation allows the appliance to be rated "Double Insulated" and the need for grounding of the unit is eliminated.

Polygon's design and performance engineers use their extensive knowledge and experience in composites science to assist customers in determining the best fiber architecture and finishing to produce ideal secondary insulating sleeves for every application. This includes customizing sizes and machining holes and cutouts to fit numerous applications.

Composite materials are the ideal choice for insulative applications because they can be tailored to almost any engineering challenge. Polygon's design flexibility is unmatched and includes; fiber winding, finishing, and more according to customers precise needs. The outstanding dielectric and insulating properties of Polygon's industry-leading composite materials eliminate the risk of capacitance coupling, while their high torque strengths ensure durability.

Polygon Tube double insulation tubing holds an Underwriter's Laboratories (UL) certification AFW-G-10. Polygon's rigorous quality control standards ensure that every finished tube is tested at 5,000 volts minimum to guarantee its dielectric integrity.

Polygoncomposites.com

ACS

LAUNCHES LINE OF DRIVE MODULE PRODUCTS

ACS launches the first in a new line of high-performance Intelligent Drive Module products. The IDMsm is a 2- or 4-axis EtherCAT DS402 universal servo drive featuring unique control algorithms and processing technologies that enhance the performance of high-precision motion stages. Certified as EtherCAT Conformance Tested, the IDMsm provides up to 5A continuous and 10A peak per axis with 12–48 VDC drive supply.

"We're excited to offer our unique servo control and motion-to-process synchronization capabilities, backed by more than 35 years of high-performance motion control expertise, for demanding applications that utilize any brand of EtherCAT-based controller," says Jason Goerges, ACS Motion Control general manager North America and global vice president of marketing. "High-tech capital equipment manufacturers have a wide range of EtherCAT servo and stepper drive offerings to choose from. When OEM machines must outpace the competition in throughput, accuracy and time to market for sophisticated features, the IDMsm is the drive to win," Goerges added.

acsmotioncontrol.com