Energy Initiative

The need for smart, sustainable and efficient components

Matthew Jaster, Senior Editor

With a global population projected to grow to almost 9.7 billion by 2050, accessing energy remains a significant challenge around the world.

For energy applications like wind, solar, oil/gas, and hydropower, components need to be smarter and more sustainable. They need data-driven metrics to prevent downtime and outages. Smarter components will continue to increase in the coming years, particularly in the energy market.

The Regal Rexnord Perceptiv services team is an extension of the maintenance team on the ground. This partnership ensures that each customer maximizes uptime (courtesy of Regal Rexnord).

Regal Rexnord Optimizes Gearboxes for Energy Applications

"Conserving our planet's resources and using them efficiently are extremely important to Regal Rexnord's customer base," said Joe Bierschbach, technology manager – gearing, Regal Rexnord. "Using a gearbox with optimal efficiency for each application is also essential. We know a solar power application requires rigorous gearbox specifications to properly take advantage of the finite amount of sunlight while using the minimal amount of power to articulate the panels."

Bierschbach said that the oil and gas industry is trending toward more efficient electromechanical solutions that will leave a smaller footprint while not compromising productivity.

"Historically, a customer had two options. The first option was to rebuild/replace gearboxes on a prescribed maintenance cycle based on historical failures. The second was to wait until the gearbox broke during operation and the customer experienced downtime. Neither option is ideal when you consider the cost of unplanned downtime and unnecessary rebuilds," he added.

Today, Regal Rexnord highly recommends that a customer take advantage of Perceptiv intelligence diagnostics and monitoring for their gearbox and use this data made available through this system to plan downtime, rather than react to unplanned downtime. In this regard, Bierschbach said that Regal Rexnord is a one-stop shop for gearbox users in the energy industry.

"Our experts are available to specify the initial gearbox selection, monitor that gearbox while in operation, notify the customer of any necessary maintenance, and deploy to the field to perform that maintenance. If a full rebuild is needed, Regal Rexnord has an industry-leading rebuild facility that can restore a customer's assets to like-new condition," he said.

The level of monitoring for gearboxes has increased exponentially over the last several years. Regal Rexnord is at the forefront of this advancement

Perceptiv allows users to proactively predict any issues before they occur (courtesy of Regal Rexnord).

with its Perceptiv intelligence offering, which allows users to proactively predict any issues before they occur. Customers partner with Regal Rexnord to perform predictive maintenance and can forecast when rotating elements need to be serviced. This approach allows maintenance to be scheduled proactively at times where it will cause the least disruption, rather than to interrupt normal production. Regal Rexnord is committed to staying at the forefront of new and more accurate ways of monitoring the health of our customers' most critical assets.

According to Bierschbach, gearboxes fail for numerous reasons, but one of the most prevalent is inadequate maintenance. "Users typically perform the prescribed oil changes but unfortunately ignore other components of the gearbox. While maintenance teams have the best intentions, some of the most critical components such as the bearing, seals and gears are overlooked. In the past, these components could only be monitored visually. At Regal Rexnord, we pride ourselves in taking the subjectivity out of predicting maintenance and gearbox failure. The Regal Rexnord Perceptiv services team is an extension of the maintenance team on the ground. This partnership ensures that each customer maximizes uptime and is warned early of pending gearbox failure," Bierschbach said.

Efficiency, uptime and extended maintenance intervals will be drivers for innovation in the coming years. At Regal Rexnord, these trends will be monitored by sophisticated Perceptiv services packages that will become a standard offering customized for each gearbox.

"Regal Rexnord's ability to offer the complete industrial powertrain to customers in the energy sector will hit each driver," he added.

www.regalrexnord.com

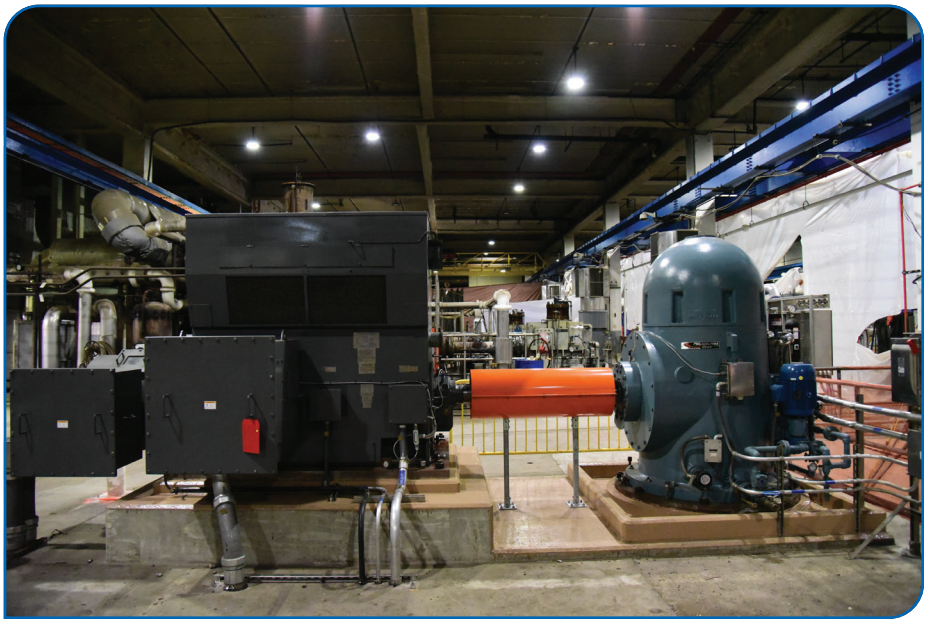
Philadelphia Gear Focuses on a Sustainable Future

With the emergence of the movement to reach Net Zero emissions by 2050, the role of Philadelphia Gear as part of the larger network of nationwide gear and motor repair facilities that make up Timken Power Systems has never been more vital. Timken Power Systems' broad electromechanical knowledge and capabilities help its customers save money and, most importantly, contribute to a more sustainable economy by extending the lives of mission-critical equipment and parts that are essential to keeping the world in motion.

"Greater efficiency has always been a core value of our gear operations and innovations, and now this legacy has been expanded to include aftermarket repair services for motors, bearings, and control systems," said Carl Rapp, group vice president, Timken Power Systems. "Our new offering allows our customers to leverage our engineering capabilities to develop more sustainable solutions that extend the life of essential machine parts while reducing cost, waste, and the downstream carbon footprint. And we've seen these efforts make a big difference as our industrial repair and service business helps to reduce the environmental impact by recycling more than 1,000 tons of steel and 75 tons of copper each year from service parts that can't be reused."

Rapp said customers often ask themselves two important questions when deciding between buying a new gearbox or repairing it: Is the equipment salvageable? What is the opportunity cost of removing critical equipment from service and waiting for a new replacement versus having it repaired?

"Downtime, for many of our customers, first and foremost means the loss of power for millions of homes during times when they need it most. Secondarily, those types of outages can translate into mounting financial losses for energy companies ranging in the hundreds of thousands of dollars each day their equipment is out of service. And with lead times for new equipment that could span up to four



Philadelphia Gear drivetrain system includes new electric motor, right-angle pump drive, and control system.

months (in many cases), the decision becomes simple, and the need for a high-quality, versatile repair facility that offers onsite service and superior manufacturing capabilities can quickly become evident," Rapp said.

And how is data-driven manufacturing and IIoT solutions helping gearbox customers today?

"The importance of collecting, understanding, and continuously monitoring critical data has always been a crucial part of our business. Those efforts can be traced back before computers, where we recorded customer equipment information into logbooks which we've since scanned and added to a searchable database that's now part of our massive electronic data archive. Some of that information dates back to the 1950s and 60s, and remarkably our engineers will still often refer to it to help service equipment that continues to run in the field today. So, whether it's expanding our network capabilities, adding more advanced instrumentation, or investing in new machinery, we see the role of tools like these only growing in the decades to come."

An excellent example of this effort, throughout the past year and a half during the COVID outbreak is that our facilities offer customers 100% remote, real-time witnessing of gearbox inspections, load testing, and progress monitoring through video and online conferencing technology.

The most common answer the company hears regarding gearbox failure is lubrication challenges. Rapp said that continued reliability, successful operation, and the long life of power transmission equipment are largely dependent upon the constant supply of lubrication oil of the proper quantity, quality, and condition.

"So, whether it's the wrong type of oil to match the operating requirements, an improperly specified lube system, or the lack of a proper routine maintenance plan, lubrication issues can cause anything from minor to catastrophic gearbox failures. Thus, when designing a gearbox, the importance of selecting the appropriate lubricant, type of lubrication system, and integrating the proper instrumentation for condition monitoring cannot be understated and are vital factors that will affect the longevity and performance of every gearbox," Rapp said. "During the design phase of our gearboxes, our engineers find it essential to work closely with customers to gain a deeper understanding of the application and the environmental conditions to design the optimal system type and recommend the best maintenance schedule to increase the performance and longevity of their equipment."

Trends in recent years include customers moving from "off-the-shelf" products to working with companies that offer superior manufacturing capabilities and can also serve as a trusted advisor to provide more comprehensive solutions. Rapp anticipates this trend to continue to evolve and grow as energy customers are now tasked with not only adapting their technology but retuning their processes to fit within the Net Zero 2050 agenda.

"As a result, we've seen energy providers moving towards developing more complex hybrid systems to fill the gap until they achieve fully sustainable carbon-neutral solutions. So, in a nutshell, this translates to the need for companies to be closer to their customers, understand their evolving needs, and develop a fully customized solution that's adaptable, efficient, and affordable. And most importantly, we see this as a core competency that doesn't end just inside the gearbox but extends across all electrical and mechanical systems, including electric motors, generators, and control systems that help support their rotating equipment," Rapp added.

Philadelphia Gear and Timken Power Systems will continue to advance its products and technologies in the future.

"We've implemented several software tools to help meet this need, including finite element analysis, computational fluid dynamics, parametric modeling, and online configuration tools to aid in shortening lead times and developing more efficient and better-designed equipment. We've applied this training and these principles across our entire network of Timken Power Systems facilities, so our gear, motor, and control systems experts are versatile and prepared to adapt and grow with our customers' evolving needs," Rapp said.

www.philagear.com

Dunkermotoren, Part of AMETEK, Inc., Provides Auxiliary Drive Solutions for Energy Applications

Dunkermotoren delivers solutions for the fields of combustion, wind, solar and water energy. "We are not doing the main drives, but auxiliary drives such as actuators (solar tracking), locks and valves. We are also providing motion solutions for equipment such as the autonomous solar panel cleaning robot from SolarCleano, or for equipment of the maintenance of wind turbines," said Stefan Tröndle, product manager at Dunkermotoren. The SolarCleano is a solar panel cleaning robot that can be managed by one person using a remote control. It can clean a solar panel in a single pass returning the solar cells to full productivity.

Dunkermotoren is committed to providing more efficient and productive technologies for the energy market like the motion solutions it provides for the SolarCleano.

"Our DC-motors are not addressed by the existing energy standards but do exceed the requirements in terms of efficiency. When a pneumatic solution is replaced by an electrical motor and gearbox solution from Dunkermotoren, the efficiency is improved from approximately 5 to 70 percent," Tröndle said.

The most common answer the company hears regarding gearbox failure in energy applications includes selecting the wrong-sized products based on unclear requirements, according to Tröndle.

"Our new planetary gearbox series PLG xx SL and the spirotec gearbox STG 65 with exceeded lifetime, might be a suitable solution for less gearbox failure," he added.

The PLG series, for example, has the highest continuous torque capacity of all types of gearboxes; at the same time, they have a very compact design, low weight, and excellent gear efficiency of typically 97%. The planetary gearboxes are also maintenance-free. The STG series has gearboxes with right-angled output. The core element of the series STG is the spiral wheelset. It enables to reliably transmit high moment with comparatively small center distance in a small space.

Dunkermotoren's components are monitored using a variety of IIoT solutions. With the IIoT functionality of Dunkermotoren's motor and gearbox combinations, for example, it is possible to read the current consumption and the temperature. If one of the values is going up, this can indicate that the product is wearing out and needs to be replaced within the next overhaul.

It is already possible to read information such as temperature, current draw and hours of operation (operating hours counter).

Tröndle believes the trends in the energy market in the future are clear. "All motion products will have an IIoT interface. Dunkermotoren has the right interfaces for the motors and gearboxes," he added. "These trends will include more efficient solutions with higher power density as well as more sensing capabilities via IIoT."

www.dunkermotoren.com

The Optimal Path

The path forward is to optimize plants and processes by upgrading the individual components as well as the complete electrical and mechanical systems. Digital solutions will continue to play a significant role in the energy market as the gearboxes, motors and drives continue to evolve. **PTE**

Solar panel cleaning robot (courtesy of SolarCleano 2021).