

CC-Link Partner Association

EXAMINES TSN BENEFITS IN MANUFACTURING

Time-Sensitive Networking (TSN) is considered by industry leaders as the future of industrial communications. In effect, it is poised to bring data transfer to the next-level, enabling Industry 4.0 applications. While the adoption of TSN is still in its early stages, with future-oriented businesses picking up the pace, this technology holds enormous potential for numerous manufacturing sectors.

Thomas Burke, global strategic advisor at the CC-Link Partner Organization (CLPA), looks at how different industrial sectors can reap a multitude of benefits by leveraging TSN for industrial communications:

1. Simplified machine design and higher performance for the converting sector

One of the key features of TSN that can bring great benefits to manufacturers is its ability to synchronize all network devices with high accuracy, especially when used with gigabit bandwidth. As a result, it is possible to ensure deterministic communications for time-critical high-speed applications, such as motion control.

For example, when this feature is adopted in networks used in the converting industry, plants can achieve accurate synchronization between multiple axes on a machine. By being able to control the motion of many different axes simultaneously over one network, facilities can optimize product quality and production processes as well as increasing the flexibility of their architectures and machines, while simplifying the mechanical set up. The end result is reduced time for retooling and maximized product yield.

2. Transparency and traceability for food & beverage

Accurate and precise time synchronization, as offered by TSN technology, is also extremely important when transparency and traceability are crucial.

The success of sensitive industries, such as food & beverage, relies heavily upon key process data, which need to be monitored to ensure product quality and compliance with relevant regulations or good manufacturing practices. These data require accurate timestamps that support visibility within the network and throughout the production process, eliminating any “blind spot” where issues can grow unnoticed.

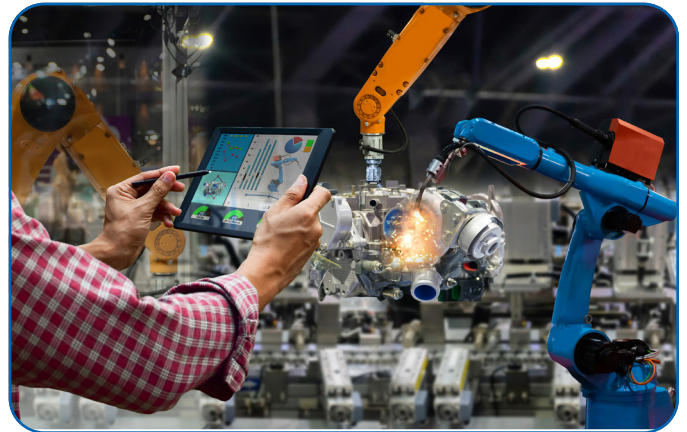
By building a fully synchronized device network, TSN can support precise timestamping for timing analysis. In this way, food & beverage facilities can rely on a high degree of traceability throughout their networks and guarantee product quality and safety.

3. Better quality in automotive

TSN technology, particularly when combined with gigabit bandwidth, can also push manufacturing facilities to speed up their production processes, whilst ensuring determinism. This can be particularly useful for automotive assembly plants.

These facilities are responsible for the production of a wide variety of models, each characterized by different trim levels.

Hence it is mandatory for these manufacturing systems to handle large amounts of data generated in real time during the assembly of various car parts. Only in this way, manufacturers can ensure that the different combinations of possible model variations do not slow down cycle times and the allocated parts are fitted correctly on the right models, at the right time, in a traceable manner. Automotive companies can use TSN to build production lines that ensure short cycle times, as the technology combines advanced synchronization with traffic prioritization capabilities. The latter allow the network to deliver time-critical traffic exactly when needed, while allowing less critical traffic to co-exist on the network. Consequently, total cost of ownership can be reduced, since multiple types of network can now be combined onto a single hierarchy. The end result is higher performance, lowered costs and simplified maintenance. This finally translates into better quality vehicles.



4. Higher levels of integration for semiconductor manufacturing

Synchronicity and traffic prioritization are also key to combining different types of process control on one network and effectively handling different recipes and activities across multiple machines and stations.

For example, TSN can support the semiconductor industry, which is characterized by numerous processing stages, all requiring process, discrete and motion control, along with integration of robots and IT systems. TSN-based networks for the sector allow businesses to mix time-critical data for high-performance, high-speed motion control with slower, less time-dependent traffic, e.g. for machine vision process monitoring. Furthermore, manufacturers are given the opportunity to integrate auxiliary systems into their process and associated networks.

Ultimately, semiconductor producers can enhance flexibility in their network architecture and in their processes.

am.cc-link.org/en/

Schaeffler's Jeff Hemphill

ASSUMES PRESIDENCY OF SAE INTERNATIONAL

Schaeffler Vice President and Chief Technical Officer **Jeff Hemphill** is the new president of SAE International for 2021. Hemphill, whose one-year term officially began on January 20, was elected by the SAE International general membership.

Hemphill is a 23-year member of SAE International. In addition to serving on the SAE Clutch Standards Committee, he has authored and organized various SAE International technical papers, served on meeting panels, presented at SAE International conferences, and participated in and organized sponsorship of SAE International's North American International Powertrain Conference since its inception.

"SAE has been a constant presence throughout my career," said Hemphill. "Its mission – to advance mobility knowledge and solutions for the benefit of humanity – is of critical importance during this time of rapid innovation and industry transformation. The opportunity to serve as SAE International president is a tremendous honor for me, and I am looking forward to an exciting year."

As chief technical officer for Schaeffler in the Americas, Hemphill is responsible for research and new product development for automotive transmission, engine and chassis applications as well as industrial components and systems. To date, Hemphill has had nearly 80 patents filed or issued.

A 31-year veteran of the automotive industry, Hemphill started his career at Schaeffler as a machinist and co-op student while earning a Bachelor of Science degree in mechanical engineering from The University of Akron. He also earned an Executive Certificate in Strategy and Innovation from the Massachusetts Institute of Technology.

www.sae.org/about/leadership



Nidec Corporation

TO ACQUIRE MITSUBISHI HEAVY INDUSTRIES MACHINE TOOL CO., LTD.

Nidec Corporation has announced it will acquire Mitsubishi Heavy Industries Machine Tool Co., Ltd.

Nidec has been actively engaged in manufacture, sales and services associated with reduction gearboxes and pressing machines through its subsidiary, Nidec-Shimpo Corporation. After completion of the acquisition, Mitsubishi Heavy Industries Machine Tool will become the Nidec-Shimpo's third main business. Furthermore, the



company expects to utilize Mitsubishi Heavy Industries Machine Tool's technology for its future insourcing plan.

Nidec is expecting further demand increase for E-Axle, the electric vehicle traction unit that Nidec is most focused on at present. They aim to expand the sales of this product which combines a motor, an inverter and a reducer, it therefore imperative to strengthen manufacturing capabilities of gears, the core component of the traction unit.

Mitsubishi Heavy Industries Machine Tool started its business in 1936 for manufacturing of lathe in Hiroshima, Japan. Since then, Mitsubishi Heavy Industries Machine Tool has been a group company of Mitsubishi Heavy Industries and has grown its business, while supporting Japanese manufacturing for many years. Mitsubishi Heavy Industries Machine Tool, which designs, manufactures and sells machine tools, cutting tools and related products and provides after-sales services for the products, owns highly professional personnel in addition to its long-nurtured technologies. Mitsubishi Heavy Industries Machine Tool has products related to automotive transmissions and reducers businesses, such as a gear cutting machine and a gear grinding machine with high accuracy and efficiency. The company has top market share in Japan with this product. The company also has laser and semiconductor manufacturing equipment with unique cutting-edge technologies.

After this acquisition is completed, Nidec has a view of further expansion of machine tool business with Mitsubishi Heavy Industries Machine Tool, and believes that, with necessary investment, the business will be able to play a major global role.

www.nidec.com

EASA

OFFERS GUIDE FOR MOTOR REPAIRS

EASA has published a "Good Practice Guide" that can help end users obtain three-phase electric motor repairs and rewinds that maintain the motor's energy efficiency and reliability.



The Guide explains in practical terms industry best practice repair/rewind procedures from ANSI/EASA Standard AR100-2020: Recommended Practice for the Repair of Rotating Electrical Apparatus that apply to all three-phase electric motors, including Premium Efficiency/IE3 motors. Based on rewind studies by independent test facilities, these procedures maintain and sometimes even improve the efficiency of repaired/rewound motors.

"More than 97 percent of an electric motor's lifetime cost is for the electricity it uses to operate. Any measurable change in its efficiency can significantly affect operating costs, a big

concern for end users” said Linda Raynes, CAE, EASA president and CEO. “EASA’s Guide provides practical insights about repair/rewind procedures for end users who can rely on ANSI/EASA AR100 to evaluate repair services and providers.”

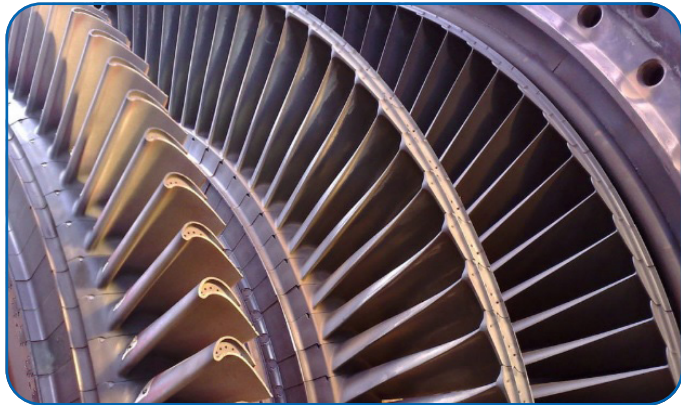
The new Guide covers best practices for inspection, testing, mechanical repair and electrical rewinds. It also explains how repair procedures can affect common types of motor losses and motor efficiency, underscoring the importance of requiring service providers to follow the repair best practices in ANSI/EASA AR100-2020.

www.easa.com

QuesTek

AWARDED MATERIAL DEVELOPMENT FUNDING FOR ENERGY APPLICATIONS

QuesTek Innovations LLC recently announced that it was awarded \$1.2 Million in funding from the U.S. Department of Energy’s Advanced Research Projects Agency-Energy (ARPA-E). The funding will be used to design and develop a novel materials solution for next-generation turbine blade alloys and compatible coating systems. QuesTek will design a system of functionally-graded Niobium-based alloys suitable for Additive Manufacturing and that will be capable of sustaining high temperature operation and thus increasing fuel efficiency.



Dr. Dana Frankel, QuesTek’s manager of design and product development, stated “Designing a new turbine material with significantly better performance than current nickel-based superalloys is one of the biggest challenges facing the field of materials science today.” She added, “We’re excited for this opportunity to apply our proven computational materials design approach to develop a new refractory turbine alloy, paving the way for a step-change in turbine engine performance and efficiency.”

QuesTek will apply its Integrated Computational Materials Engineering-based models and extensive experience in design of superalloys, refractory alloys, high entropy alloys, and coatings to design a printable niobium-based multi-material alloy system. Concurrent design of material and component, with the goal of accelerating adoption of the designed materials into next-generation engines, will be achieved by teaming with leading turbine engine OEM Pratt & Whitney to define aerospace requirements, perform component design,

and guide testing and qualification. Furthermore, the project team includes NASA Jet Propulsion Laboratory for AM process development, and the University of Minnesota for coating development.

QuesTek received this competitive award from ARPA-E’s Ultrahigh Temperature Impervious Materials Advancing Turbine Efficiency (ULTIMATE) program, to develop and demonstrate ultrahigh temperature materials that can operate in the high temperature and high stress environments of a gas-turbine blade.

This effort directly addresses the need to improve gas turbine efficiency for aerospace and energy applications (e.g., ground-based industrial gas turbines), critical for increasing fuel economy and decreasing carbon emissions. Engine efficiency is fundamentally determined by maximum cycle temperature, and thus scales directly with the operating temperature. However, current state-of-the-art superalloys have limited high-temperature stability.

www.questek.com

Auburn Bearing

ACQUIRES AUROTEK TSB

As of February 1, 2021, Auburn Bearing & Manufacturing Inc, an American-based designer and manufacturer of thrust bearings, custom bearings and precision components, is excited to announce that it has acquired the assets of Aurotek TSB, Inc.

Aurotek TSB, Inc. is specialized in the production of precision thin section bearings for a broad array of industries. These bearings are used in a variety of applications, namely, for use in defense weapon systems, medical equipment, radar equipment, aerospace guidance systems, packaging machines, industrial assembly machines, and robotics for security, medical, nuclear and defense systems.

Auburn Bearing & MANUFACTURING

Made in the USA since 1898

Peter Schroth, president of Auburn Bearing & Manufacturing, notes that this acquisition aligns with the company’s strategy to expand their product offerings to include American-made precision radial bearings, along with current thrust ball and roller bearings, in low- to mid-volume production runs and with reasonable lead times.

Aurotek TSB was founded by Dr. Don Cancelmo, who spent his entire career working in the thin section bearing industry. Auburn Bearing & Manufacturing had been a supplier of rings and bearing components to the company since 2011.

Previously located in Herkimer NY, the operations and assets of Aurotek TSB will be moved to Macedon, NY, where the business will continue to operate within the Auburn Bearing & Manufacturing facility, located at 4 State Route 350, Macedon, NY 14502.

www.auburnbearing.com

Poggi

CONTINUES SUCCESSFUL GREEN AND SUSTAINABLE JOURNEY WITH PHOTOVOLTAIC SYSTEM

Poggi Trasmissioni Meccaniche Spa continues to provide green solutions and focus on renewable energy. The photovoltaic system installed last winter by Siat Energy has recorded performances in line with expectations, proving to be an asset of strategic importance for the company's future. During the first operation year, the plant recorded a high-level performance, producing a total energy of 402,383 kWh and reducing the emission into the atmosphere of 233.4 tons of CO₂.



The plant, consisting of 1,383 modules of 285 Wp each and with a nominal power of 394,155 kWp, recorded performances in line with the expectations and estimates of engineers and technicians of Siat Energy, a leading player in the sector, who oversaw its development in all its phases, from the feasibility study to the technical implementation. From 3-13-2020 (working start) until 12-31-2020, the monthly comparison between expected and actual production marked very slight differences, in some cases negative, in other cases positive as in March, April and September when the actual produced energy exceeded the estimated one.

Altogether, the expected project values were met with a total energy produced equal to 402,383 kWh instead of 412,538 kWh. Finally, on the environmental impact profile, important benefits arised for the entire community. The plant has reduced the emission into the atmosphere of 233.4 tons of CO₂, an important figure that can be translated more effectively with the imaginary presence of a small forest of 30,470 trees.

"After these first results," said Andrea Poggi, president, "we are even more convinced of the investment made. The decision to install a photovoltaic system reflects our commitment to the environment, but at the same time our will to grow as a company. I am sure that this plant will prove to be an increasingly important and strategic asset in the coming years, capable of having a positive impact not only on sustainability but also on the entire company productivity."

www.poggispa.com

Portescap

BRUSHLESS DC MOTORS ACHIEVE ISO 13485 CERTIFICATION FOR RESPIRATORS

Portescap recently announced that its slotless brushless DC motors for respirators have received ISO 13485:2016 certification. Thanks to this compliance, medical device original equipment manufacturers (OEM) can be confident their motion control system has been manufactured to the highest quality standards.

Expanding on ISO 9001, this standard contains specific requirements for parts traceability and risk management activities throughout the design and development stages. It also requires process and software validations at defined intervals. Presented by independent risk management and quality compliance firm, DNV GL, ISO

13485 compliance is an important part of Portescap's quality management system and demonstrates its consistency in design, development, production, storage and distribution.

As a result of ISO 13485 compliance, OEMs can be certain that products manufactured at Portescap's 72,000-square-foot facility in Mumbai, India meet the highest standards for quality and consistency. The plant currently includes over 1,100 staff and is outfitted with machining, winding and injection molding equipment, as well as an electrostatic discharge (ESD) safe assembly facility.

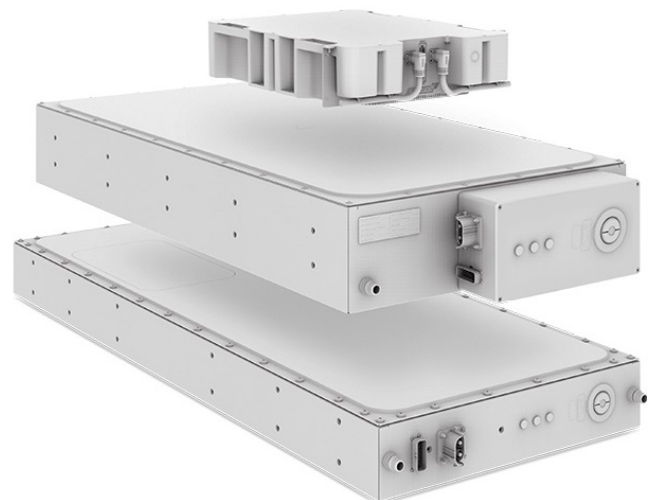
www.portescap.com



BorgWarner

AGREES TO PURCHASE GERMAN BATTERY PACK SUPPLIER AKASOL AG

BorgWarner Inc. have signed a business combination agreement ("BCA") with Akasol AG to position BorgWarner to significantly expand its commercial vehicle electrification capabilities.



Headquartered in Darmstadt, Germany, Akasol AG designs and manufactures customizable battery packs for use in buses, commercial vehicles, rail vehicles and industrial vehicles, as well as in ships and boats. This proprietary system technology is cell-agnostic, providing a low-cost, flexible solution to world-class customers. With more than 300 full-time employees and three facilities across Germany and one facility in the United States, Akasol believes it is well positioned to capitalize on the large market opportunity across Europe and North America.

"Akasol is an excellent strategic fit as BorgWarner seeks to continue to expand its electrification portfolio and capitalize on the profound industry shift towards electrification. Akasol's manufacturing footprint and established, in-production customer base are complementary to BorgWarner's and would accelerate our foothold into the fast-growing commercial vehicle and off-highway battery pack market," said Frédéric Lissalde, president and CEO of BorgWarner. "Akasol is highly-regarded as a reputable and reliable partner, and like us, they have a customer-first mentality and a culture of innovation and environmentally friendly technology leadership. We look forward to welcoming their incredibly talented team to BorgWarner."

BorgWarner believes the acquisition would significantly strengthen its commercial vehicle and off-highway battery systems business as it continues to execute its electrification strategy. With the global, lithium-ion battery market for electric vehicles expected to grow, Akasol believes it is well positioned to meet the demand for battery systems in the global electric commercial vehicle market.

"The executive board welcomes the strategic partnership with BorgWarner, as it offers significant strategic perspectives to Akasol," said Sven Schulz, CEO and founder of Akasol. "BorgWarner shares our vision of emission-free mobility, and with joint forces, we will expand Akasol's technology and market leadership for high-performance battery systems."

www.borgwarner.com

Regal

TO COMBINE WITH REXNORD'S PMC SEGMENT

Regal Beloit Corporation and Rexnord Corporation have announced that they have reached a definitive agreement whereby Rexnord will separate its Process & Motion Control ("PMC") segment by way of a tax-free spin-off to Rexnord shareholders and then immediately combine it with Regal in a Reverse Morris Trust ("RMT") transaction. Regal shareholders will own 61.4% and Rexnord shareholders will own 38.6% of the combined entity ("New Regal"), before a potential dividend to Regal shareholders and a corresponding ownership adjustment to Rexnord shareholders, sized at closing to ensure that RMT ownership requirements are met. Rexnord



shareholders will continue to own 100% of the businesses' Water Management platform.

With the addition of PMC, Regal's 2020 pro forma revenue was approximately \$4.1 billion with Adjusted EBITDA of \$740 million, excluding \$120 million in annualized cost synergies expected to be achieved by year three after closing. The pro forma 2020 EBITDA margin was approximately 18%.



The transaction combines Regal and PMC's best-in-class power transmission portfolios to drive innovation in industrial power transmission and motion control solutions through superior engineering, technology, and manufacturing capabilities. PMC is a world-class provider of specialized, highly-engineered power transmission components and solutions, with a strong portfolio of Industrial Internet of Things ("IIoT") solutions. The transaction expands Regal's portfolio, customer reach, and product diversity while creating shareholder value through enhanced growth and substantial cost synergies.

"This transformative combination brings together two highly complementary businesses, creating a premier provider of power transmission products, poised to deliver enhanced value for our customers, associates, and shareholders," said Regal CEO, Louis Pinkham. "Combining with PMC accelerates our transformation momentum and is an important step towards our vision to accelerate profitable growth. We believe this transaction will create meaningful value for customers by providing comprehensive solutions across the entire industrial drive train, increased portfolio and reach, and an enhanced presence in diverse and attractive end markets and geographies. Shareholders will benefit from compelling value creation and financial benefits, including enhanced growth, cost synergy-driven margin expansion, attractive ROIC, and earnings accretion."

"We have long admired PMC's products and capabilities, highly-regarded brands, and talented team. Importantly, Regal and PMC are a terrific cultural fit with a shared commitment to integrity, customer success, continuous improvement, and a passion to win. We are confident these shared values and complementary business structures will help facilitate a seamless transition and fuel our continued success," he added.

Todd Adams, chairman, president and CEO of Rexnord, commented, "This transaction provides clear and compelling value for Rexnord shareholders through ownership in a combined company with enhanced scale and significant growth opportunities. Regal is committed to investing in the continued growth of its power transmission business, and we are confident the PMC platform and team are a perfect fit to accelerate their strategy. Rexnord's Water Management business will be well-positioned to continue to drive differentiated growth as a standalone business aligned around its distinct competitive advantages and market dynamics."

www.regalbeloit.com

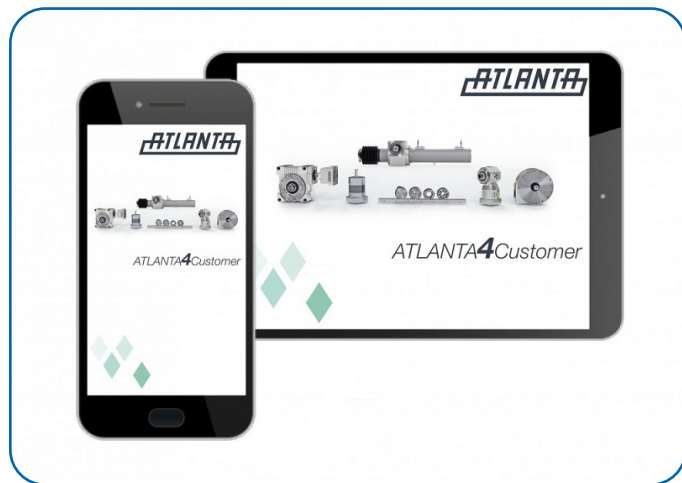
www.rexnord.com

Atlanta Drive Systems

OPTIMIZES GEAR RACK ASSEMBLY WITH DIGITAL TOOLS

The positioning accuracy of a rack and pinion drive is dependent on the cumulative pitch error inherent in each gear rack used. For long travel lengths, this cumulative pitch error can add up very quickly and dramatically affect the positioning accuracy of the axis.

Atlanta now offers “digital” gear racks and a smartphone app that when used together can optimize the assembly of a multi gear rack system to minimize the cumulative pitch error and maximize positioning accuracy over the complete axis travel length.



A “digital” gear rack has a 2D matrix code (similar to a QR code) and serial number marked directly onto it to encode the gear rack production and measurement information. This transforms an ordinary gear rack into a “digital” gear rack with smart drive technology built into it.

The “digital” gear rack can now be used with the ATLANTA4Customer smartphone app to create an assembly map. The app allows a customer to scan the 2D matrix code on the gear racks and download the encoded manufacturing information from the Cloud. This information can be used to create an assembly map for the gear racks.

For a desired travel axis length, a series of gear racks would be set out to be scanned. Each gear rack would be scanned into the smartphone app, which would collect all of the gear rack pitch error information into the mapping tool in the app. Once all of the gear racks have been scanned, the smartphone app would sort the gear rack assembly order to achieve the minimum cumulative pitch error and maximum positioning accuracy for the total axis length.

This can be very helpful for machines with longer travel lengths, allowing for significant machine performance and precision improvements with increased assembly efficiency using standard, off-the-shelf Atlanta rack and pinion products.

www.atlantadrives.com

Timken's Philadelphia Gear

EXPANDS RELATIONSHIP WITH U.S. NAVY

The Timken Company is expanding upon its decades-long relationship with the United States Navy. Huntington Ingalls Industries – Newport News Shipbuilding (HII-NNS) recently awarded a contract to Timken's Philadelphia Gear to supply the main reduction gears (MRGs) for the future USS Doris Miller (CVN-81) aircraft carrier.

Philadelphia Gear will provide engineering support for the MRGs at its technical center in King of Prussia, Pa., and will perform manufacturing and assembly at its marine center of excellence in Santa Fe Springs, Calif. The cumulative value of the contract is in excess of \$100 million, with delivery of the MRGs scheduled for 2025-2026. Once commissioned, the Doris Miller will serve in the Navy's Fleet into the 2080s.



Computer-generated image courtesy of the U.S. Navy.

“Philadelphia Gear has built essential gear systems for a variety of classes of U.S. Navy ships over the years, and we’re honored to continue that relationship by supplying the MRGs for CVN-81,” said Carl Rapp, Timken group vice president. “We thank HII-NNS for entrusting us with this critical role for the U.S. Navy’s cornerstone platform.”

The Doris Miller is the first aircraft carrier named for an enlisted sailor and the first named for an African-American. It’s part of the Gerald R. Ford carrier class of 1,100-foot-long, 100,000-ton ships. Considered the centerpiece of the Navy’s Carrier Strike Groups (CSGs), each Gerald R. Ford class ship is able to accommodate 75+ aircraft.

Timken acquired Philadelphia Gear, a recognized leader in high-performance gear drives, components and related services, in 2011. With over 128 years of power transmission design experience, Philadelphia Gear offers world-class expertise in the service and manufacture of power transmission equipment.

www.timken.com