

eKontrol

OFFERS ELECTRIFIED POWERTRAIN FOR COMMERCIAL VEHICLES

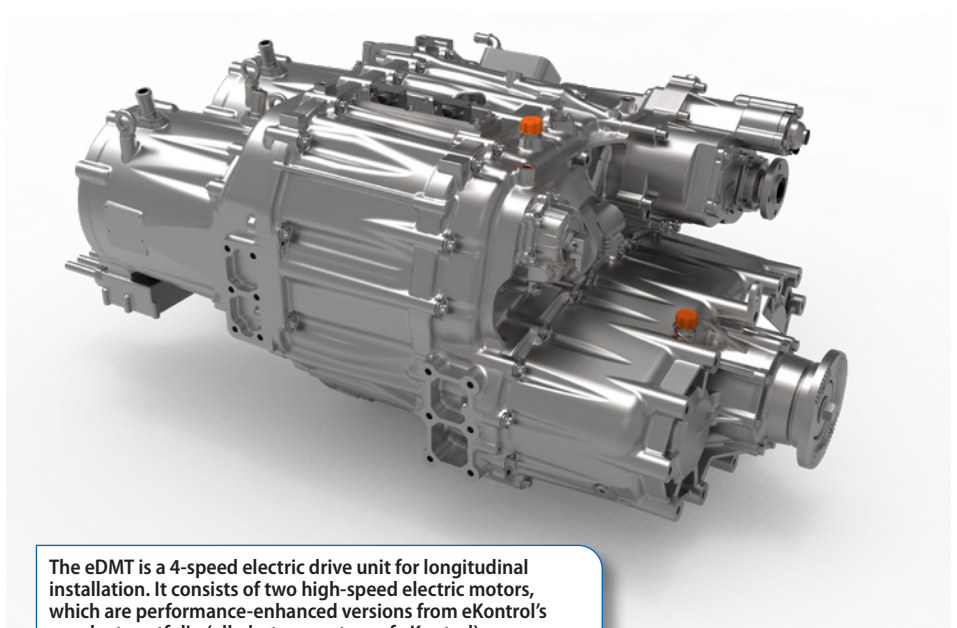
CAO ZHENG, MANAGING DIRECTOR, eKONTROL GMBH

At present, commercial vehicles have become the key breakthrough direction for global automotive electrification. After years of development and market validation, the centralized powertrain arrangement above suspension has become the main structure, among which three technical routes can be divided: direct drive, deceleration drive and multi-speed drive.

The direct drive is a simple way to realize the electrification in the early stage, which is, replacing the conventional combustion engine with an e-motor, and eliminating the transmission system to directly drive the vehicle. The structure is simple and reliable with high transmission efficiency, which is especially suitable for vehicles with driving demands only under low-speed and moderate speed working conditions. However, because the direct drive structure is not dedicatedly designed for powertrain electrification, it focusses on replacement and therefore has limitations. To guarantee the large torque output of commercial vehicles, the volume and weight of the direct drive e-motor must be dimensioned accordingly, which makes the fulfillment of the requirements of lightweight and high integrity of the whole vehicle quite challenging. Accompany with this, the problem of power surplus occurs.

At the same time, direct drive is limited by the maximum power of the single motor, so the requirements of the heavy-duty truck cannot be met, thereby the possible application fields are greatly restricted. The direct drive route is considered as an interim solution for commercial vehicles powertrain electrification.

In addition to urban low-speed conditions, commercial vehicles are more commonly found in the medium speed suburban road, high-speed road and more complex off-road conditions. To fulfill the requirements of all conditions covering “on-road and off-road” and “medium and heavy-duty,” a superior technology route must apply. To ensure both the power and



The eDMT is a 4-speed electric drive unit for longitudinal installation. It consists of two high-speed electric motors, which are performance-enhanced versions from eKontrol's product portfolio (all photos courtesy of eKontrol).

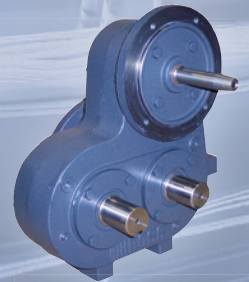
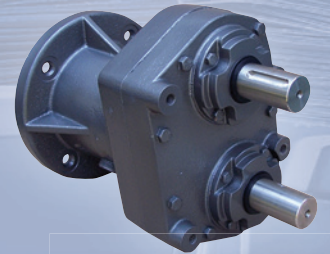
maximum speed performance while improving the transmission efficiency, for electrified commercial vehicles, it has become a consensus in the industry that multi-speed powertrain is still essential.

By introducing a multi-speed transmission, the drive system can amplify the output torque. Under the premise of meeting the vehicle's power demands, the size and weight of the e-motor can be reduced, at the same time the higher efficiency and higher power density of the whole system can be achieved, while covering both low-speed torque and high-speed efficiency demands under climbing and high-speed working conditions. Because of the rated current reduction coming from the e-Motor downsizing, the whole powertrain system minimizes the loss and capacity of the battery. The multi-speed drive is especially suitable for medium and heavy-duty trucks on high-speed roads, super-heavy vehicles for off-road conditions as well as non-urban commercial vehicles such as highway coaches and suburban buses. It has a great market prospect and development potential and will bring a revolution for commercial vehicle electrification.

eDMT – The Electrified Powertrain System Solution

Nowadays the mechanical Automatic, Manual Transmission (AMT) is mainly used in electrified commercial vehicles with “on-road and off-road” and “medium and heavy duty” applications, which is based on the conventional mechanical automatic transmission cooperating with a single motor. Three main shortages are existing in this powertrain configuration. Firstly, the maximum power of a single motor is still limited, which cannot meet the power demand of large heavy-duty trucks. Secondly, the power interruption of mechanical automatic transmission while shifting leads to poor shift comfort and reliability. Thirdly, affected by the heavy load on the ramp, the phenomenon of “unable to shift” often happens, resulting in safety problems.

To realize the continuous power shift, a rather mature solution in the passenger car market is available — automatic transmission (AT), but it has a disadvantage in high cost and low efficiency, which is not suitable for further application in electrified commercial vehicles; on the other hand, the dual-clutch transmission (DCT) can also



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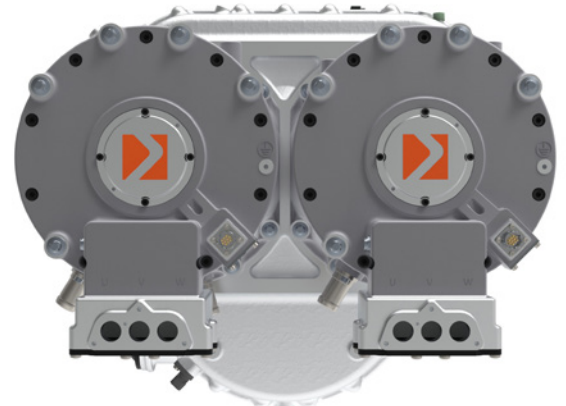
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realize, but its key component, dual-clutch is complicated in structure with high-reliability requirements, hence its application in commercial vehicles is restricted.

The company eKontrol, an established manufacturer of electric and hybrid powertrains from Suzhou, China, has creatively developed the eDMT (electric Dual Motor Transmission) to be used in vehicles with a total weight of 31 to 90 tons, after an in-depth analysis of various technical routes of

the drive system and comprehensive investigation of user needs. The eDMT is a 4-speed electric drive unit for longitudinal installation. It consists of two high-speed electric motors, which are performance-enhanced versions of existing tried and tested units from eKontrol's product portfolio. The system's maximum power from the electric motors is 400 kW and it has a maximum



Exterior view of the electric machine drive unit.

combined input torque of 800 Nm.

The system succeeds in dynamic gearshift through high-speed dual motors as a power source, modular transmission combinations, sequential power shift mechanism and precise fixed-point active lubrication system. The combination of various working modes greatly improves the transmission efficiency and power density of the electric drive unit, realizes the lightweight of the total system, and greatly prolongs the service life of the product, thus providing a highly reliable, efficient and maintenance-free powertrain system for commercial vehicles electrification.

Structure Principle

The eDMT structure principle consists of: Dual-motor (400 Nm, 10,000 rpm): High-speed motors reduce the peak torque. Compared with the single motor with large torque, the volume and cost of the motor are greatly reduced.

Designed with five parallel shafts, 2 motor input shafts, 2 output shafts (1 drive output shaft, 1 PTO shaft), 1 countershaft. The two-way gear lubrication pump and PTO are connected with the EM2 through the fixed shaft gear set.

Three mechanical gear ratios are available. EM1 shifts the module through dog-clutch A, enables the connection with the first gear set or third gear set; EM2 shifts the module through dog-clutch CU and connects to the second gear set or EM1.

There are 2 mechanical dog-clutches with minimized drag loss. The shifting system is activated with an electric



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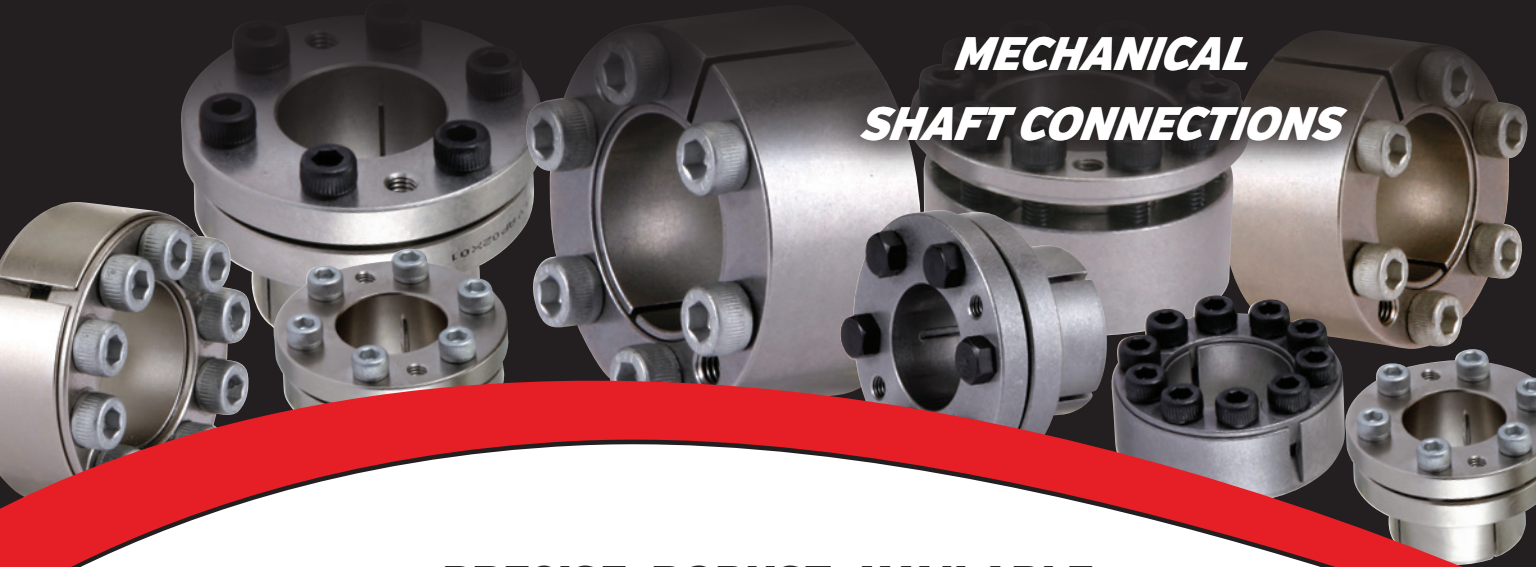


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control module. The components consist of one driving motor, one shift drum and two shift forks.

The transmission has a modular design, combination use of gearbox and the transfer case (Module 2) are possible.

Application & Vehicles

With the platform and modularization as the basic design idea, eDMT can fully cover the commercial vehicle products of “from on-road to off-road” through the arrangement and combination of various motors, gearboxes and transfer cases, mainly including:

12–55 ton road trucks and special purpose vehicles to meet various conditions such as classified highways, environmental sanitation, logistics, and engineering operations;

50–100 tons of super heavy-duty field vehicles, such as mining dump trucks, port tractors and short factory barges;

25–55 tons of urban muck trucks, suitable for the mixed conditions of urban roads and suburban roads to meet the construction needs of urban construction sites;

10–14 m highway coaches and suburban buses to meet the highway passenger transportation, tourism or suburban lines under high-speed conditions;

12–18 m city buses, such as 12–13.7m city bus, 10–13m double-decker bus, 16–18m articulated bus.

The eDMT from eKontrol offers a unique solution for electrifying large commercial vehicles with complex operating conditions covering city and highway travel speeds or steeply inclined roads. With a suitable and efficient driveline, electrification is not only possible but profitable in more areas of the transportation sector beyond passenger cars and city buses.

For more information:

eKontrol GmbH
Zhengcao@auto-ekontrol.com
www.auto-ekontrol.com

Gates Corporation

OFFERS HIGH-PERFORMANCE BANDED V-BELT

Gates recently introduced the world’s first wrapped V-Belt technology using Ethylene Elastomer (EE) compounds for original equipment manufacturers (OEMs) in the agriculture, forestry and heavy industrial markets. The launch of the Xtreme V-Force Mega banded V-belt platform leverages Gates’ materials science and manufacturing process expertise to produce unique EE-based solutions that provide customers with increased performance and uptime, and extended operating temperatures.

market, including:

- An extended operating temperature range from –40°C to 130°C;
- A 30% increase in load capacity and durability, which enables:
- Performance in even more demanding applications;
- The ability to design higher-load drives without increasing the design footprint on today’s high-powered equipment
- Improved flex for higher-speed drives;
- The elimination of chlorinated



“At Gates, transforming our industrial belt platforms using Ethylene Elastomer compounds is a priority,” said Tom Pitstick, CMO and senior vice president of product line management for Gates. “With the development of our PowerGrip GT4 synchronous belts, G-Force RedLine CVT power sports belts and the new Xtreme V-Force EE banded belt family, we are leading the way in advanced materials development in our industry.”

The new Gates Xtreme V-Force Mega belt offers a number of benefits vs. currently available products on the

polymers, which improves the overall environmental impact of these products.

Ethylene Elastomers, which involve complex processing technology, help enable a number of the performance advantages of this new belt platform. Gates’ continued focus on the intersection of materials science and process engineering is what has enabled the company to bring these and other Ethylene-based products to market.

For more information:

Gates Corporation
Phone: (303) 744-5800
www.gates.com/xtreme

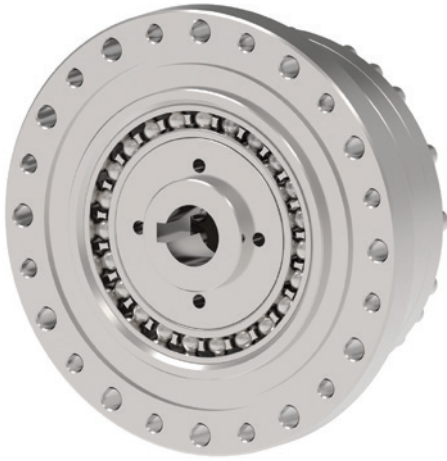
GAM

INTRODUCES GSL ROBOTIC STRAIN WAVE GEARBOXES

GAM announces the release of the new GSL series of strain wave gearboxes. The new gearboxes provide zero-backlash and high torque in a small gearbox for robotic and motion control applications.

The GSL gearbox uses harmonic gearing for a very compact design that easily integrates into applications requiring high ratios and high precision in a small form factor. The GSL series is available in frame sizes 14 to 40 and reduction ratios 50:1 to 160:1.

“GAM has always been known for our breadth of products,” said Craig Van den Avont, president at GAM, “and with the introduction of the GSL strain wave gearbox, we bring that breadth of product to our zero-backlash gearbox offering including our GCL series cycloidal gearbox and our revolutionary GPL zero-backlash planetary gearbox.”



Options for the GSL series include the “hat” and “cup” type with keyed bore, hollow, or shaft inputs. The GSL is also offered in basic component form for fully integrating into applications. The GSL series can be used in a wide variety of applications, such as robot joints, autonomous remote vehicles, antenna positions, or any other applications requiring zero-backlash and high torque in a small gearbox.

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NES

OFFERS EXPEDIATED BEARING FAILURE ANALYSIS

Failure of rolling element bearings in rotating equipment often results in lost productivity. Bearing failure, without detailed information about the root cause, results in continued loss of valuable production output. Napoleon Engineering Service (NES) is re-allocating its engineering resources to offer fast turnaround on bearing failure analysis to ensure essential businesses

have expedited answers to bearing issues.

According to NES President and Chief Engineer Chris Napoleon, "We want to go the extra mile to keep things running smoothly. We test and fail bearings every day. We're putting that knowledge and our resources to good use to reduce the lead time on typical failure analysis. If someone's production line stops it could be devastating to them and to the general public, even more so now than it usually would be."

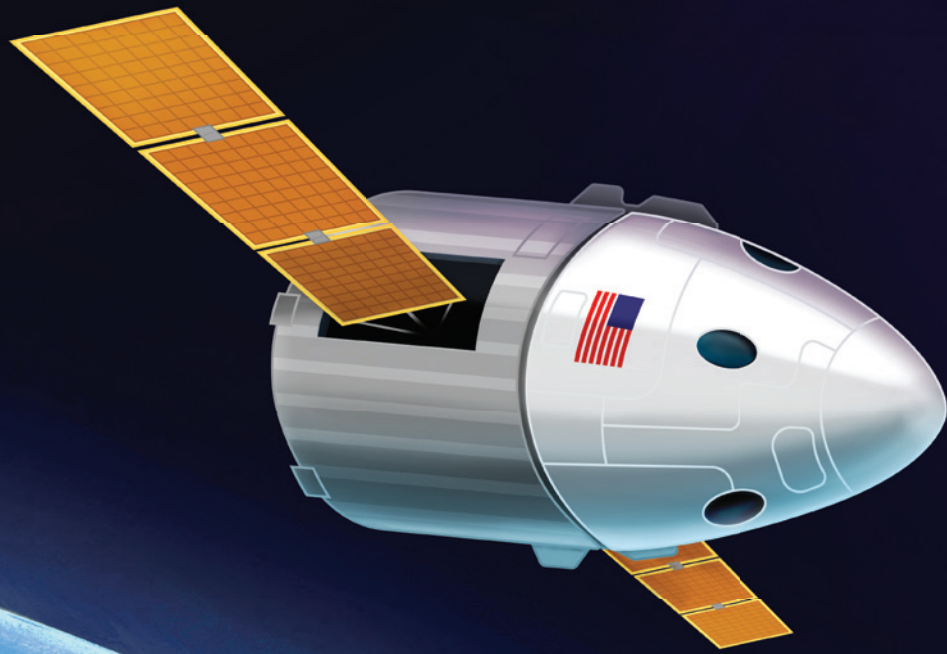
Typical failure analysis lead times can be four weeks, but NES will endeavor to get answers in the hands of the customer in 3-5 days on most failures that only require visual or dimensional inspection. "My hope is that no one needs to take advantage of this" says Napoleon. "But we'll be here, picking up the phone in two rings during normal business hours, if our customers need us."

For more information:

Napoleon Engineering Services (NES)
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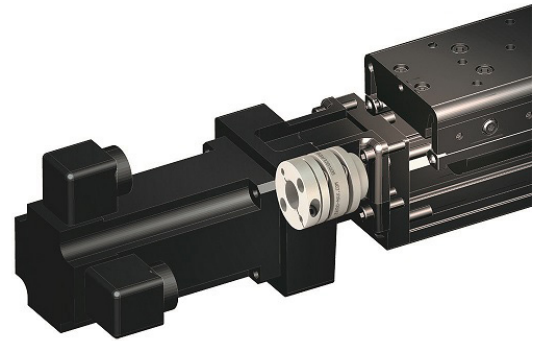


Zero-Max

SERVOCLASS COUPLINGS PROVIDE RELIABILITY AND MISALIGNMENT ADVANTAGES

Zero-Max announced that its Servo-Class Couplings provide important reliability and misalignment advantages in servo motor, and stepper motor driven applications. Demanding applications require a coupling that holds up to shock loads caused by rapid acceleration and deceleration, start/stop conditions, and torque reversals in these servo driven systems. According to Zero-Max testing and field experience, these couplings provide the durability and reliability necessary for longer life and increased machine uptime in these applications compared to other coupling styles.

“Misalignment between shafts on equipment exists in the form of angular, parallel (radial) and axial misalignment,” reports a Zero-Max spokesperson. “No matter how careful two shafts are aligned, they are never ‘perfectly’ aligned. Additional misalignment can also creep in over time from deflection due to torque loads and forces on the machine, machine wear, and eventual settling of the machine base. The ServoClass Coupling, within its ratings,



handles these types of misalignments readily and easily.”

“The ServoClass Coupling’s misalignment advantage over bellows couplings will provide for a longer lifetime where the misalignment exists,” reports the Zero-Max spokesperson. “The reason is that, in most cases, the ServoClass Coupling is not as radially stiff as a bellows coupling which reduces the reaction loads on the connected components and stresses within the coupling itself. It is designed to optimally handle torque, rotation,

and misalignment simultaneously, thus providing longer life.”

There are nineteen sizes of standard off-the-shelf couplings. These couplings are ideal for automation applications, printing and packaging equipment, semi-conductor assembly, laboratory automation, medical equipment assembly, and for most products that use ball screws, linear actuators, and servo motors. popular bore sizes.

For more information:

Zero-Max
Phone: (800) 533-1731
www.zero-max.com

Emerson

OFFERS PORTABLE IIOT TOOL FOR DIGITIZED PNEUMATICS



Emerson has introduced a new tool to help pneumatic system users quickly and easily see the potential benefits of integrating IIoT. By connecting the new AVENTICS Smart Pneumatics Analyzer to the compressed air supply on an existing machine, users will have instant analysis options for key machine characteristics such as compressed air consumption and possible leaks.

“By digitizing the pneumatic environment, the Smart Pneumatics Analyzer provides users with the option to directly experience the benefits and potential of IIoT applications on their own machine—in just a few simple steps,” says Dr. Michael Britzger, senior manager, digital transformation for pneumatic technologies at Emerson Automation Solutions. The portable analyzer case contains a

Smart Pneumatics Monitor, AS series air preparation units and a tablet for visualizing the live data. Emerson personnel can show a user within minutes how they can use IIoT-enabled data for insights into their own machine.

The monitor initially detects the system operating state, analyzes data, and provides this processed information to users for status-oriented maintenance, for example. While other solutions collect all available data and transfer it unfiltered, the Smart Pneumatics Monitor evaluates the data locally and uses it to generate information about the status of the system. All data from the valves, as well as from components connected to the I/O modules on the valve system, is read into a microprocessor and processed by means of mathematical algorithms. These algorithms are based on decades of expertise in AVENTICS pneumatic product engineering and application.

Condition monitoring, the collection of operating states and their prediction as the basis for anticipatory maintenance, offers direct advantages for customers using IIoT applications. Because they can anticipate wear before it leads to machine downtimes, they allow users to significantly increase the availability of their equipment and reduce maintenance costs. Once defined limits are reached, the electronics can automatically send messages to ERP and MES systems, as well as maintenance or other staff. Data collected can also help optimize a pneumatic systems' energy efficiency.

"It's important to us to support our customers in their digitization process as equals," adds Britzger. "Based on the analysis results, we therefore also further develop the Smart Pneumatics Analyzer together with our customers especially for their application. This way, users can experience and apply the added value of IIoT for themselves." In addition to being demonstrated by Emerson associates, the analyzer is available for sale to users if they would like to keep the unit at their facility.

For more information:

Emerson
Phone: (888) 889-9170
www.aventics.com/us/IIoT

Parker

OFFERS COMPONENTS FOR PERSONAL PROTECTIVE EQUIPMENT

During this critical time with the rapidly spreading COVID-19, Parker's Electromechanical and Drives Division North America is proud to be fabricating modular, portable safety equipment and other critical care guards or shields to exact specifications. This personal protection equipment, or PPE, assists hospitals and front-line healthcare providers who are looking

for rapid solutions to help prevent further contamination. Medical staffs are particularly at risk from viruses and other airborne ailments because of their increased exposure while treating infected patients. We want to help these front-line workers stay safe.

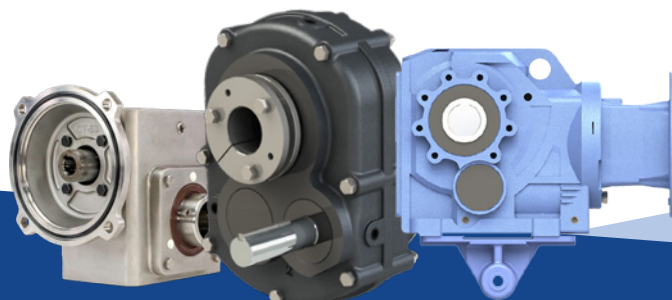
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Complementing the T-slot framing solutions is Parker's T-Slot Aluminum Design Architect, which enables users of any skill level to quickly and easily design products from Parker T-slot aluminum framing components.

The software takes the challenging task of designing products from T-slot aluminum and makes it as simple as building with snap-together blocks. Available as a free download on the Parker website, the software has been lauded by Parker design centers, professional users, and DIYers for its simple, easy-to-use interface, on-the-fly BOM generation, and instant quote capabilities.

Parker Hannifin T-slot Aluminum Design Architect features:

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For more information:

Parker Electromechanical & Drives Division
Phone: (704) 588-3246
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KISSsoft

IMPLEMENTS ISO 6336 CHANGES

ISO 6336 is the most important standard for the strength calculation of cylindrical gears. Parts 1 (principles, general influence factors), 2 (flank) and 3 (root) have been revised and republished in 2019. Compared to the previous version, the changes in the



ISO 6336-1:20

U.S. Tsubaki

LAUNCHES PRE-ASSEMBLED TORQUE LIMITER SPROCKETS

U.S. Tsubaki Power Transmission, LLC is pleased to announce the launch of the Torque Limiter Sprocket—a complete assembly providing both the Torque Limiter and sprocket together as one unit. The all-new Torque Limiter Sprocket combines Tsubaki's 100+ years of engineering and manufacturing excellence with high-quality Tsubaki Sprockets and Overload Protection devices to create a single device that provides a powerful and long-lasting torque limiting solution.

Up to now, the method for purchasing torque limiting devices required end-users to assemble the limiting device, springs, bushings and sprocket by themselves. Tsubaki has revolutionized the torque limiting device industry by offering all

these components pre-assembled and bored-to-order in U.S. Tsubaki's Wheeling, IL facility. End-users can now simply install the fully assembled unit to the shaft, set the torque limit, and move forward with operation.

Tsubaki Torque Limiter Sprockets are designed to improve both the customer ordering process and installation experience over the existing line of Tsubaki Torque Limiters. As a solutions provider, Tsubaki continually strives to offer products which will improve customer experience.

For more information:

U.S. Tsubaki
Phone: (800) 323-7790
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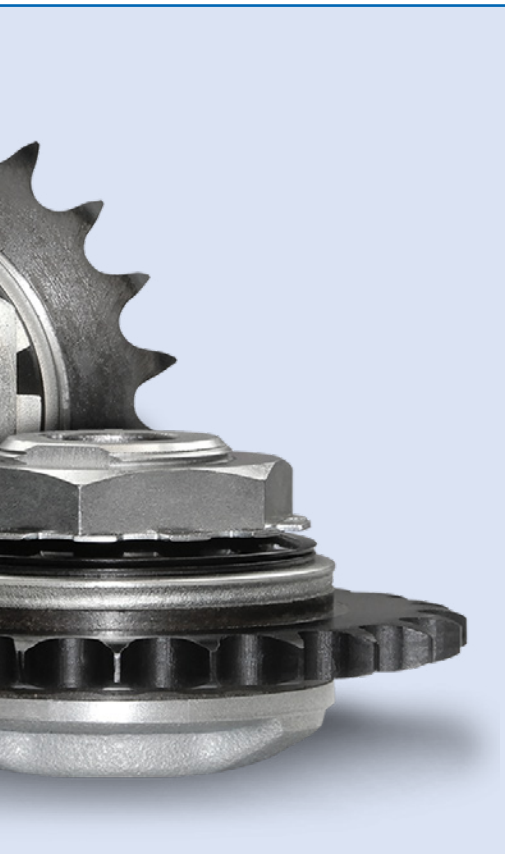
calculated safeties are in some cases significant and will influence the design of gears as well as the minimum safety factors required in future certification guidelines.

The changes, theoretical background and their effects were shown

in a past web demo using examples. In this recording, formulas are compared and the changes in the formulas are illustrated using the *KISSsoft* functions. *KISSsoft* experts will present the effects of the innovations using examples from wind power, EV gearboxes, etc., with different safety factors being considered.

The changes in ISO 6336 are implemented in the *KISSsoft Release 2020 (Module ZA10)*—calculations with version ISO 6336:2006 as well as ISO 6336:2019 can run in parallel.

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