

# Igus

## POLYMER BEARINGS PROVIDE LONGEVITY FOR PIANO BUILDER

An England-based piano builder is striking a new chord in the design of the centuries-old musical instrument by incorporating tribopolymer components from Igus in a unique hammer system that offers supreme longevity, climate resistance and improved playability and sound performance.

The components from Igus in Phoenix's D3D Hammer System are two-millimeter roller bearings that are used as center points for the bushless system. The pins offer smooth operation and with approximately a 30 percent increased diameter, are stronger, smoother and more dimensionally precise than traditional wire center pins. Extensive design and 3D printing work with Igus allowed Phoenix to create the new hammer system. Igus, based in Cologne, Germany, runs its U.K. operations from Northampton and its North American operations from Providence, R.I.

"These ultra-high-grade pins offer buttery-smooth operation, and with approximately a 30 percent increased diameter, are stronger, smoother and more dimensionally precise than traditional wire center pins," said Phoenix founder Richard Dain. "Igus was of the utmost help to us in their selection and provision of material for our hammer flange assemblies."

### Improving the hammer assembly

Dain, an accomplished engineer, pianist and committed patrons to the arts, turned his attention to improving the inherent limitations of the traditional hammer assembly. A piano's hammer assembly consists of a "hammer flange" — the part that is fixed in place within the overall action — a hinged shank — which defines the flightpath of the hammer — and the hammer itself. The flange, shank and hinge are traditionally made from hornbeam, a type of hardwood that when well finished is very smooth and often compared to ivory.

Although relatively strong, hornbeam is prone to changes in temperature and humidity, like all other woods. It is also difficult to produce with consistent material properties. No two pieces are quite the same. Over time shanks can warp and drift and require regulation adjustments if a piano is to respond uniformly, predictably and with even sound.

No matter how good the regulation of a traditional wooden hammer assembly, the shanks, which are typically about 6 millimeters in diameter and 13 centimeters in length, flex considerably when under the duress of energetic pianism. The hammer wobbles from side to side, and twists chaotically as it is accelerated towards the strings, causing irregular strikes. This chaos gives rise to unpleasant overtones, when the hammer does not contact the strings with precision.

### Bushless hinge assembly

The entire system in a traditional wooden assembly suffers from inefficiency due to flexing of the hammer shank. As a remedy, Phoenix chose a complex-weave carbon fiber shank to replace hornbeam. The material is superbly strong and uniform, offering superior, climate-resistant performance throughout the registers of a piano. There is also no increase in weight.



The hinged hammer flange is traditionally made of wood. Phoenix considered a range of materials to replace the flange, with a very specific aim in mind: to create a "bushless" hinge assembly. Traditional bushes are made from cylindrical felt inserts that provide an interface between metal journals (called center pins) and the wooden parts. They must provide enough "snugness" for the hammer not to wobble from side to side, but must also be sufficiently free from friction for the system not to feel stiff. High friction from a tight bearing will feel like "sluggishness" to a pianist and is another form of energy loss.

When a new hammer flange is correctly bushed, it is by definition already at a critical point with tiny margins of error. As wear inevitably takes its toll on the bushing, looseness impacts the system, causing a loss of fine control over the path of hammer flight, while noises and clicks are prone to develop as the pin rattles against the bushing. Swelling of felt in periods of high humidity cause stiffness and even seizure.

### Enormous longevity with the new system

Any noises — no matter how seemingly inoffensive in isolation — can become a nuisance to a sensitive artist, and even more so to a recording engineer. Igus, with its unique tribo-



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polymer material, has enabled Phoenix to develop a bushless action. The D3D Hammer System offers all the advantages of a traditional system in prime condition, as well as climate resistance and, what designers at Phoenix confidently predict, enormous longevity. "Indeed, we expect these assemblies may well exceed the lifespan of the piano itself," Dain said.

Already formulated for industrial bearing applications, the tribopolymer material is perfect for this application for performance and aesthetics. Its ivory-white color perfectly complements the carbon fiber shanks, and black inner felt Abel hammers. Tuning technicians appreciate the cream color, which is easy to see in the confined space of a piano action.

"From building our prototypes we have been able to ream the Igus material with relative ease, ensuring a perfect fit for our center pins," added Phoenix's James Bacon, who advised on and built the prototype. "Our test piano, which is fitted with a prototype of the D3D Hammer System, offers a fabulous sense of control and immediacy, and superbly controlled hammer flight. Pianists report that D3D is like stepping into a Ferrari after driving a Ford Model T."

Once acclimatized, pianists find that they can produce more power with less effort, and that they have a sense of connection with the piano that they have never before experienced. "All of us on the Phoenix team are confident that we have not only remedied the age-old limitations with hammer assemblies, but that we have produced a world-beating system that is a joy for pianists to use," Dain said.

## A new era in piano innovation

In the 19th century, there was an explosion of ideas within the piano industry. Reciprocity between piano builders, composers, pianists, patrons and audiences propelled enormous rates of innovation in both instruments and composition, and a variety of design concepts became available, each offering something unique to the world of music.

By the late 19th century piano building had largely converged on a design paradigm that continued throughout the 20th century, amid an atmosphere of increasing reluctance to explore new design concepts. Piano makers shifted their focus towards branding, value engineering and marketing, while innovation, if any, was skewed towards finding cheaper solutions for mass production.

In the absence of improved piano sound, which for 150 years had driven experiment with new styles, came stagnation in composing classical music. New genres of composition followed the same trend of stagnation, so much so that by the middle of the 20th century the future of classical piano came into question for lack of innovative interest.

The defining spirit of Phoenix Pianos is one of recapturing the innovative drive of the 19th century piano builders, specifically in challenging the numerous now-outmoded design limitations found in traditional instruments.

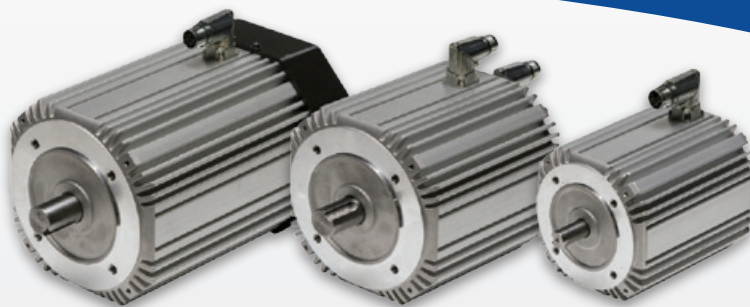
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# Renk

## WINS MARITIME CONSTRUCTION PROJECT FOR HYBRID SYSTEM

At the end of March 2019, the maritime sales team of Renk's Rheine plant managed to win its first new construction project for the maritime hybrid system called MARHY. This system enables ships with 2-stroke engines to efficiently generate on-board power supply by using the main engine (PTO-operation). In addition, a fully electric drive (PTH-operation) is available for zones with low emissions zones (port areas) and for emergencies.

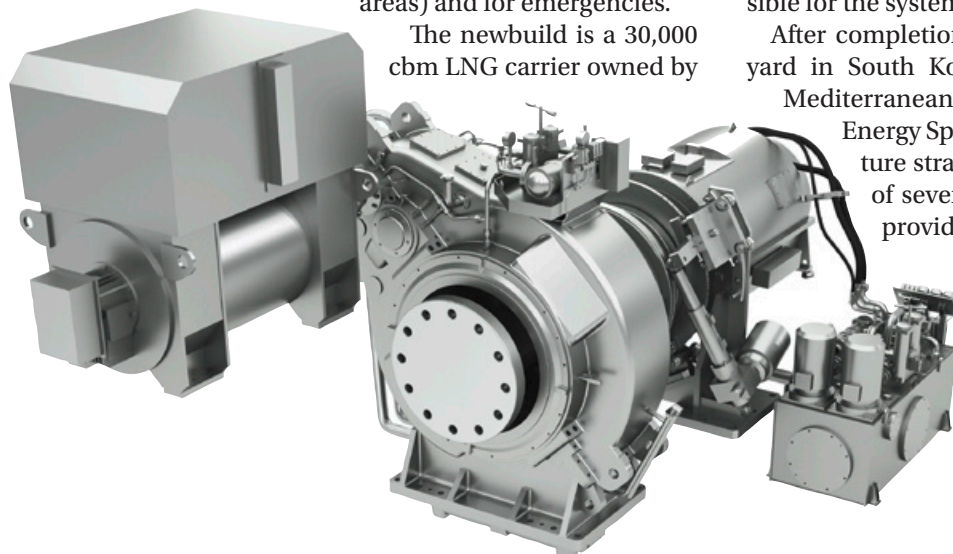
The newbuild is a 30,000 cbm LNG carrier owned by

Knutsen OAS. It is equipped with a 6,00 kW strong 2-stroke main engine and is the first of this size. RENK's scope of delivery includes a tunnel gearbox (type SHHII-1600), a fully-automatic PSC-85 (Propeller shaft clutch), elastic couplings, and, for the first time, key electric components. These include a 1 MW generator/e-motor as well as the corresponding frequency converter. In addition, Renk is responsible for the system integration.

After completion of the ship at the Hyundai Mipo shipyard in South Korea, it will be stationed in the Italian Mediterranean Sea and operated by Milan-based Edison Energy SpA. The LNG carrier is part of an infrastructure strategy, which provides for the construction of several LNG depots along the Italian coast to provide a reliable energy supply.

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# Regal Beloit

RELEASES LINE OF VARIABLE-SPEED REPLACEMENT MOTORS

Regal Beloit Corporation, a manufacturer of electric motors, electrical motion controls, power generation and power transmission components, announces the release of the new Genteq Evergreen VS product line of variable-speed replacement motors.

Genteq Evergreen motors are reliable, easy-to-install, electronically commutated motor (ECM) retrofits designed for use in residential and light commercial Heating Ventilation and Air-Conditioning (HVAC) systems. Evergreen VS motors are highly efficient, pre-programmed, dual-voltage, dual-rotation motors that provide both versatility and ease of installation.

The Evergreen VS motor and Evergreen VS user interface are designed to replace Genteq constant airflow (variable-speed) ECM indoor blower motors. The Evergreen VS product line is designed specifically to replace Genteq models 2.3, Eon and 3.0 motors. These motors represent the largest volume of variable-speed motors used in HVAC original equipment manufacturer (OEM) indoor blower motor applications.

"I'm excited about Regal's new line of Evergreen VS motors," said Birch Taylor, distribution business unit vice president, Regal. "They are versatile 16-pin and four-pin truck-stock ECM blower motors built to the Genteq quality standards found in OEM equipment. The Evergreen VS line is a proud member of the ECM Made Easy family of innovative aftermarket solutions."

Millions of OEM variable-speed motors could be replaced with just five parts on a service truck. With the expansion of the Evergreen line with the new variable-speed motor solution, it is now even easier to reduce on-truck inventory and complete more calls on the same day without driving to retrieve a part.

The Evergreen VS motor and Evergreen VS user interface (5K010) are used together to replace the Genteq model 2.3 or Eon motor. The Evergreen VS motor is a direct replacement for the Genteq model 3.0 motor.

## For more information:

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# Heidenhain

SUPPORTS MASTERCAM TO BETTER ENABLE 5-AXIS MACHINING

In a collaborative effort to best enable 5-axis machining for users with HEIDENHAIN TNC controls and *Mastercam* CAD/CAM software, a new collaborate post processor is now available. Called the *Heidenhain TNC 5X Mill post processor*, CNC Software, Inc., developers of *Mastercam* software, introduced it recently after coordinating development efforts between the two companies. Collaboration also included beta testers and industry resellers in order to best meet the worldwide demand of providing a consistent, high quality Heidenhain translation post.

All Heidenhain control users that use *Mastercam* CAD/CAM software can now benefit from this newly developed processor, including those using iTNC 530, TNC 620 and TNC 640 controls.

"Heidenhain is committed to ensuring that our control customers have the tools they need during any 5-axis machining application, and this collaboration post processor is just one example," explained Gisbert Ledvon, Heidenhain TNC business development manager. "We are now experiencing an increased demand in North America for our newest TNC 640 control for high precision 5-axis machine tools, and we want those customers to know that if they have *Mastercam* software, we are dedicated to providing ongoing translation updates as needed!"

## For more information:

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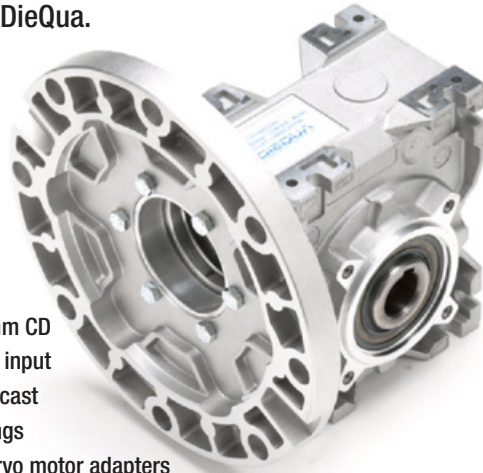


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ANNOUNCES RANGE OF ETHERNET/IP-ENABLED DRIVES AND INTEGRATED MOTORS

A range of servo drives, stepper drives and integrated motors from Applied Motion Products now conform to the ODVA specification for EtherNet/IP communications. The ODVA Conformance Program mandates that vendors use a common network interface to ensure interoperability with products from other vendors. Products must pass rigorous testing by an authorized Test Service Provider before declared ODVA conformant.

ODVA conformant servo drives, stepper drives, and integrated motors perform their specific positioning, velocity and other motion control tasks while simultaneously exchanging control, I/O and diagnostic data with controllers on the EtherNet/IP network. Customers who rely on EtherNet/IP as the backbone of their industrial Ethernet network can speed time-to-market for their machines and end products by specifying ODVA conformant devices. Customers have the freedom to choose products from an international vendor pool and the peace of mind that those products will interoperate in multi-vendor systems.



The line of ODVA conformant drives and integrated motors from Applied Motion Products includes:

**SV200 Digital Servo Drives:** advanced performance and auto-tuning with multiple control options.

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**StepServo Integrated Motors:** high-resolution incremental encoders and closed-loop servo firmware combine to create integrated motors that offer the best performance available from a step motor.

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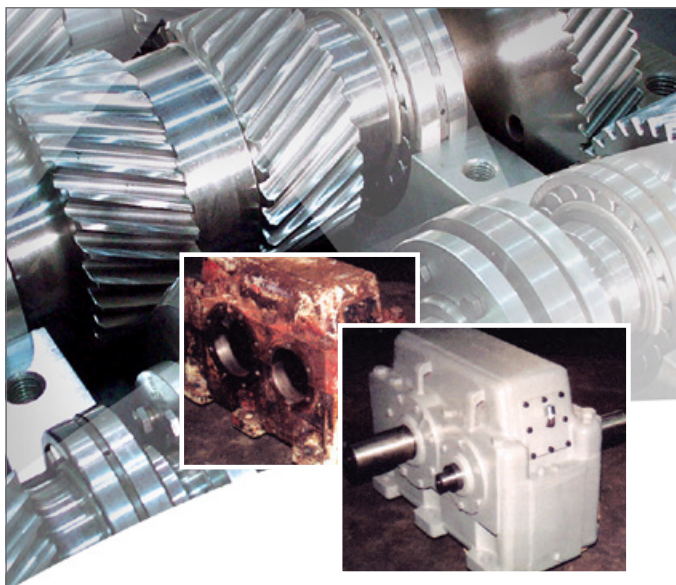
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The CD Coupling's high torsional stiffness is due to the coupling's unique composite disc design. The precision composite material and disc pack design provide a high degree of torsional stiffness while also handling inevitable shaft misalignment in the system.



CD Couplings are designed to withstand the punishment and stress of flanged gearbox applications. In comparison, other couplings may have high torsional stiffness specifications but can be too brittle to withstand the punishment of high speed reversing loads typically seen in these applications.

Also important, the coupling's composite disc withstands all types of environmental elements, including temperature extremes from -70° to +250°F, as well as moisture and a wide range of chemicals. The robust disc and overall coupling design help increase the longevity and reliability of the motion system in which the coupling is used.

Additional operating features include: zero backlash, smooth operation at high speeds, maintenance free operation and compact size that fits most applications. CD Couplings are durable and have very long life cycles, helping to ensure uptime and throughput for the machines they are used on.

CD couplings are available in many models and sizes, including custom designs for unusually high speed and dynamic applications such as high speed packaging machinery and automation equipment. Standard models and sizes include single and double flex models with clamp style hubs with or without keyways. The torque capacities range from 20 Nm to over 10,000 Nm with maximum speed ratings from 3,000 rpm to 14,000 rpm or higher for custom designs.

All CD couplings are environmentally friendly and are manufactured of RoHS compliant materials.

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# NORD

## EXTENDS LINE OF SINGLE-STAGE HELICAL GEAR UNITS

NORD Gear Corporation has announced the addition of three single-stage gear units to its NORDBLOC.1 line. The new SK871.1, SK971.1 and SK1071.1 represent the three largest single-stage NORDBLOC gear units manufactured by NORD and provide industry-leading thrust load capacity per case size.

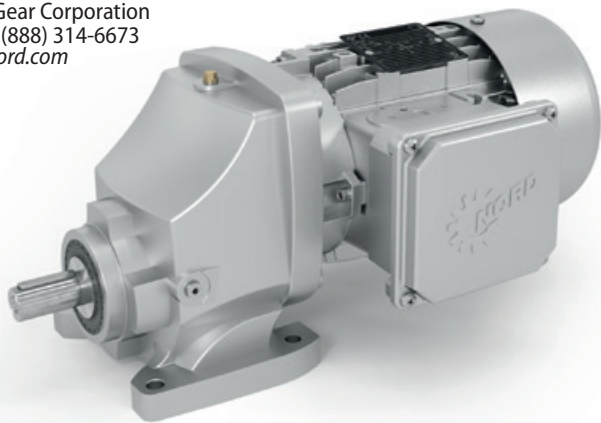
The new products have a power range of 30 to 60 hp, a torque range of 3,540 to 8,850 lb-in. and a ratio range of 1.41 to 8.09:1. With durable UNICASE cast iron housing and optimized bearings, they can reliably handle large axial and radial forces and are perfectly suited for pumps, mixers, conveyors and industrial fans.

Since NORD added single-stage units to the NORDBLOC.1 line in 2017, more than 65 OEMs in the United States have specified the single-stage units for a host of customer applications in food and beverage, oil and gas, and chemical industries. The newly expanded line will enable NORD to capture greater market share by providing a wider selection of configurations at a lower cost than competing gear manufacturers.

"The primary reason for extending the single-stage product line is to provide customers in our target markets a full offering to cover all of their operational requirements," said Tom Koren, director of engineering at NORD.

### For more information:

NORD Gear Corporation  
Phone: (888) 314-6673  
[www.nord.com](http://www.nord.com)



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