Corus' New Gear Steels Reduce Alloys Without Sacrificing Achievable Hardness

Corus Engineering Steels' formula for its new gear steels: Maintain achievable hardness while using fewer alloys, thereby cutting steel costs for gear manufacturers.

Located in Rotherham, England, Corus Engineering Steels (CES) announced the new gear steels in July 2004.

"Lean alloy steels have been developed as a direct response to rising alloy prices" says James Hunt, market & product development manager for CES. "Lean alloys are by definition less costly than the higher alloy steels they replace."

As an example, Hunt says a leaner alloy steel, like an MnCr, could be as much as £182 ($327) per ton cheaper than a higher alloy steel, like an NiCrMo. The savings comes from differences in the base prices and alloy surcharges of the two steels.

"The biggest difference comes when we take into account the alloy surcharges," he says. "The prices for molybdenum and nickel are extremely unstable and very much higher than chromium."

CES develops its gear steels mainly for the automotive industry, supplying them to BMW, Eaton, Ford, General Motors, Scania, Volvo and ZF. CES' new gear steels are, however, suitable for other industries, too.

"Examples might include gearboxes and geared motors for food processing, mechanical handling or marine applications," Hunt says.

"However, it must be recognized that there are limitations to the depth of hardness and core strength which can be achieved by a low alloy steel, hence larger diameter gears may not be suitable," he adds. "Each application should be considered on its specific requirements."

Despite these limitations, CES designed its new gear steels to behave like their higher alloy counterparts, so gear manufacturers who switch to leaner alloys don't sacrifice performance, such as the ability to achieve a particular hardness range.

"Corus steels are typically supplied to give hardenability response of +/– 4 HRc, with tighter ranges available by agreement," Hunt says. "This applies to all our steels, not just lean alloy grades."

Also, Corus' steelmaking helps promote predictable distortion.

"The precise control we are able to get over our steelmaking processes with full computer control, gives exceptional cast-to-cast consistency of chemical composition and hardenability," Hunt says. "Hence the predictability of all our steels ensures that the manufacturers need to make fewer adjustments to their processes from batch to batch."

Hunt, however, cautions that predictable distortion is a potentiality that depends on other processes: "The amount of distortion achieved has more to do with the gear manufacturing route than it does the composition of the steel."

Still, if the route provides reliable, repeatable results, gear manufacturers could ultimately save time and money through better control of distortion because they wouldn't have to machine their gears as much after heat treatment.

Hunt adds that the new gear steels are very clean, which promotes increased fatigue resistance and thereby increased durability.

"Fatigue and durability are influenced by surface hardness and steel cleanness," Hunt says. "The cleanness of all our steels ensures that harmful oxides and other inclusions are kept to a minimum, and it is this property that gives improvements in fatigue and durability."

"If you were to compare the fatigue performance of one of our lean alloy steels against a higher alloy steel of equivalent strength, also supplied by Corus," Hunt adds, "chances are there would be little difference as the cleanness will be the same."

He cites its MnCr steel as an example. That steel has a hardenability comparable with Corus' 1%NiCrMo steel. The MnCr was designed to replace the NiCrMo. CES also developed its lean alloy gear steels to help improve the noise, vibration and harshness (NVH) characteristics of resulting gearboxes. Hunt couldn't discuss details of specific tests on the NVH characteristics of gears made with CES' new steels. Even if he provided details, NVH characteristics vary as a result of many aspects of gear manufacturing. "Particular benefits seen in NVH will depend upon the consistency of the steels being substituted and the level of control achieved over the manufacturing process."

Despite depending on manufacturing processes, the new gear steels are Corus' effort to provide the same for less.

"Rising alloy addition surcharges and the continual focus on best value led to the development of lean alloys," Hunt says. "Expert product development ensured that reduced cost did not come at the expense of performance."

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New Speed Drive for Wind Turbines from Voith

The WinDrive from Voith Turbo can convert a spectrum of input speeds into a constant output speed in the multi-megawatt range.

According to the company's press release, key components include a hydrodynamic torque converter and planetary gear designed as a superimposing gear. With this drive, low and variable rotor speeds are converted into high, constant speeds. Due to constant output speeds, synchronous generators can feed the produced electricity directly into the grid.

This eliminates the need for power electronics for frequency adaption. According to Voith, this drive concept can improve the weight and space requirements in the nacelles of wind turbines.

In addition, the WinDrive has an integrated torque converter because input and output are connected due to hydrodynamic transmission of power.

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Dow Corning Synthetic Oils to Improve Gearbox Life

Dow Corning Co. has introduced six new full synthetic Molykote® extreme pressure gear oils to provide improved wear protection plus greater thermal and oxidative stability when compared to conventional oils.

According to the company's press release, oils are designed to overcome severe operating conditions, such as temperature extremes and shock load

or vibration. The Molykote L-21XX Series PAO gear oils combine protection against scuffing and micropitting with water separation and corrosion protection. Additionally, the gear oils are formulated with carefully selected additives to inhibit rust and oxidation and suppress foam.

Available in ISO viscosities of 100 (L-2110), 150 (L-2115), 220 (L-2122), 320 (L-2132), 460 (L-2146) and 680 (L-2168), the oils meet or exceed the following standards: Flender, DIN 51 517 Part 3, ANSI/AGMA 9005, U.S. Steel 224, Cincinnati Milacron and David Brown SL.53.101.

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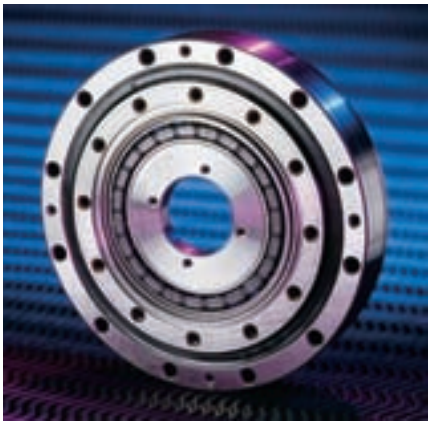

New Ultra Flat Gearhead from HD Systems

The SHD Size 14 gearhead from HD Systems delivers zero backlash, 1.5 arc-min. positional accuracy, and +/– 5 arc seconds repeatability.

According to the company's press release, the gearhead combines high precision harmonic drive gearing and a high capacity cross roller bearing. The Size 14 gearhead has an outer diameter of 70 mm and is 17 mm in length. Rated torque is 33 in.-lbs. and comes in gear ratios of 50:1 and 100:1.

Suitable for OEM applications, the design allows the gearhead to be incorporated into the machine housing by providing the necessary motion control components, such as the harmonic drive gear and cross roller bearing. Support of a large output torque and moment load are possible.

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Self-Calibrating Speed Sensor Detects Gear-Edge Motion

The ATS616LSG speed sensor from Allegro MicroSystems is designed as a solution for non-TPOS camshaft applications, providing improved electrostatic discharge and electromagnetic compatibility and eliminating the need for an external switching capacitor. The smaller gear tooth sensor package is integrated to maintain airgap range and high timing.

This sensor is a peak-detecting device using automatic gain control and an integrated capacitor to provide accurate gear-edge detection down to low operating speeds. Each sensor subassembly consists of a high temperature plastic shell that holds together a samarium-cobalt magnet, a pole piece and differential

open collector Hall IC that has been optimized to the magnetic circuit. The package can be used in conjunction with various gear shapes and sizes, according to the company's press release.

Gear sensing technology used for the sensor subassembly is Hall-effect-based. In addition, the sensor incorporates a dual element Hall IC that switches in response to differential magnetic signals created by ferrous targets. Processing circuitry contains an A/D converter that self-calibrates the device's internal gain to minimize the effect of airgap variations. A patented peak-detecting filter circuit eliminates magnet and system offsets and can discriminate relatively fast changes, such as those caused by tilt, gear wobble and eccentricities, yet provides stable operation to low rpm. The sensor is suitable for use in gathering speed, position and timing information using gear-tooth-based configurations.

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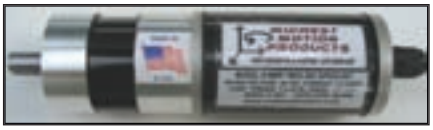

New Gearmotor from Midwest Motion

The new MMP-TM55-36V-007 DC gearmotor from Midwest Motion Products can accept any 36-volt DC source, including batteries.

According to the company's press release, this gearmotor measures 2.14" in diameter and 6.75" long and has a keyed output shaft of 12 mm in diameter by 25 mm long. Easy mounting is possible with four "face mount" M5 threaded holes, equally spaced on a 40 mm diameter bolt circle.

The motor is rated at 0.85 Nm continuous torque at 700 rpm and has a 40 Nm peak. Despite its size and weight, the motor requires 2.6 amperes at 36 volts DC to generate its full-load output torque.

Typical options include integral optical encoders, failsafe brakes, analog tachometers and planetary gearheads with ratios from 3:1–450:1 with standard or low backlash precision gearing.

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