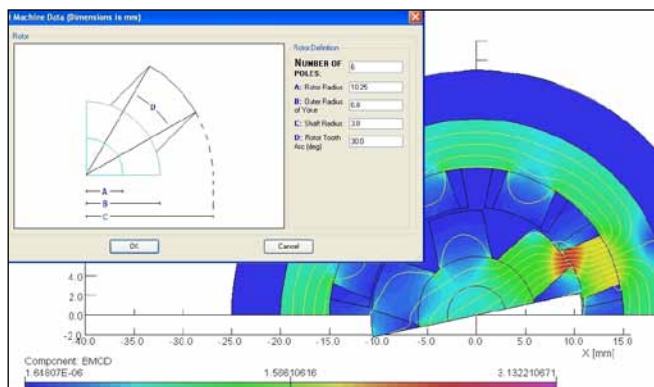


## Identifying Motor Design Characteristics

COBHAM OFFERS AUTOMATION SOFTWARE SOLUTIONS

Optimal design solutions to rotating electrical machine requirements can now be created in hours, by non-specialists, using a new version of design automation software from Cobham Technical Services. Cobham's *Machines Environment* introduced a new level of user friendliness when it was launched by providing a design entry system that allows precision finite element analysis (FEA) models of motors



and generators to be created and solved in minutes. The two-dimensional (2-D) version of the software has now been integrated with Cobham's unique optimization tool which automatically finds the solution within a design space—even for multiple or competing design objectives.

Cobham's *Machines Environment* is an application-specific extension to the well known *Opera* electromagnetic simulation package. It provides a front-end to the simulator that speeds design entry by means of Wizard-style dialog boxes. Users select

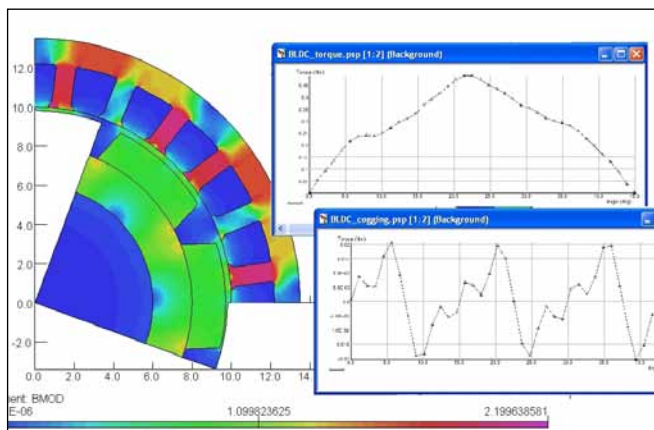
the style of motor or generator they want to design from a library of all common types, including induction, brushless permanent magnet and switched reluctance motors, and synchronous motors or generators. Then, dialog boxes allow the user to enter parameters to define mechanical geometry, material properties and electrical data, and the FEA model is automatically created.

The use of parameterized models and the ability to quickly load and modify previous designs has always made it possible for users to perform 'what-if?' design investigations. Now, to extend these possibilities to the maximum, Cobham has integrated a unique optimization tool that makes it simple for users to find the best solution across the design space. While auto-optimization tools are not new, they usually require manual intervention if the globally optimal solution is to be found, and the simulation times involved often make this impractical. Cobham's Optimizer 'intelligently' selects and manages multiple goal-seeking algorithms including stochastic, descent, particle swarm and Kriging to eliminate the need for manual intervention.

Setting up an Optimizer run from the *Machines Environment* has now been made as easy as the design entry process. Because most FEA simulations can take as little as a few seconds, the integrated software makes it feasible to thoroughly explore the design space. Thousands of simulations can typically be executed within hours.

"This software makes the high accuracy of finite element analysis available to all engineers, not just the expert with years of experience," says Cobham's Jeremy Howard-Knight. "Even a novice engineer can now create a precision finite element model and find the best solution in a design space, without needing to know much more than what he or she wants to achieve."

The 2-D *Machines Environment* is now in its fourth generation, and Cobham has developed an extensive library of rotating machine design styles, and design components. However, if there are still any unusual features that need to be incorporated in designs, users also have open access to the scripts that generate the models, and can modify them at will to automate proprietary motor and generator design concepts. A library of common material properties is also included in the design software. Again, if users employ any special materials, such as an unusual grade of steel for laminations, then a new menu item can be created within minutes. Cobham will also generate custom scripts for users on request.



Cobham's *Machines Environment* appeals to the many users of analytic motor design programs, giving a means of performing much more accurate analysis rapidly and without the engineering overhead usually required for accurate FEA. The tool can deliver significant advantages in today's market environment. Currently, there's enormous pressure to improve energy efficiency for instance. The combination of highly accurate simulation and sophisticated optimization provides the means to identify the design characteristics of the perfect machine in very short timescales. A three-dimensional version of *Machines Environment* is optionally available.

**New Website Offers Different Approaches to Motor Design.** Cobham Technical Services has launched a new website to help engineers understand the contribution that FEA software can make to motor design cycle efficiency and design optimization. The new site ([www.motor-design-software.com](http://www.motor-design-software.com)), gives engineers a multi-faceted view of the ways electromagnetic FEA software can be used to design motors. Users can explore the underlying tools, looking at aspects such as the creation of design models or analysis of simulation results. They can also investigate the automated design approach for different types of design, by selecting a specific form of motor or related electromagnetic design topics such as magnetic gearing and linear motion. A range of interesting research material is available on the site including technical papers and details of training courses. Users may also register for a webinar on rotating machine design.

### For more information:

Cobham plc.  
Brook Road, Wimborne,  
Dorset, BH21 2BJ,  
United Kingdom  
Phone: +[44] 1202-882020  
[www.cobham.com](http://www.cobham.com)

## Pittman

### TACKLES TORQUE DENSITY AND DURABILITY

Pittman G30A planetary gearboxes are designed with maximum torque density and durability in mind. These small gearboxes are engineered to comple-

ment five different series of Pittman motors, allowing a wide range of output torques and speeds. The mounting profile is 30.5 mm (1.20 in) in diameter, or 38.0 mm (1.50 in) square when the optional mounting flange is used. Gearbox lengths vary depending on the gear

**continued**



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reduction and range from 33.7 mm (1.33 in) to 51.2 mm (2.02 in). Fourteen standard reduction ratios are available ranging from 4:1 to 1,296:1 and allow a maximum output load of 2.47 N-m (350 oz-in) to 8.83 N-m (1,250 oz-in). Custom gear ratios can also be configured to meet just about any application need.

Carefully engineered for challenging applications, the G30A planetary gearbox incorporates sintered steel planet gears to promote high torque capacity and low audible noise while maintaining a compact design. Single piece carrier plates with integral gear posts and sun gear can be arranged to achieve many different reduction ratios. The gearbox output is through a 416 stainless steel shaft and a sintered metal output bearing. Optional ball bearings are available for high radial loads.

The G30A gearbox complements the Pittman 8220, 8690, 8540, 9230, and



1300 Series brush and brushless DC motors. When the G30A is combined with the latest motor materials and manufacturing technology such as high energy neodymium magnets, silicon lamination steel, and advanced winding techniques to maximize slot fill, a high-efficiency system is created for high-tech motion applications.

### For more information:

Ametek  
627 Lake Street  
Kent, OH 44240  
Phone: (215) 256-6601  
[www.ametektip.com](http://www.ametektip.com)

## RSF Linear Encoder

ELIMINATES WEAR AND  
PROVIDES EVEN PRESSURE

RSF Elektronik, represented by Heidenhain Corporation, has released the new slim profile linear encoder series MSA 700 and 800 tailor-made for

metrology applications which require protection from contamination. Typical applications for these encoders are optical comparators, and video and vision systems. The main advantages offered by these encoders are generous mounting tolerances, low level backlash and optimized thermal behavior. Central to the design of these new encoders is the reading carriage and reading head con-





nected by a wear-free and maintenance-free magnetic coupling. The carriage is also constrained by a magnet guide that affects the ferromagnetic tapes on the extrusion. Hence, there are no forces that could stress guide parts and no contact points that could prematurely wear. Improving upon old roller bearing or spring coupled encoders, the new magnetic coupling and guide eliminates wear and provides even pressure along the measuring length. This combination allows for generous mounting tolerances without any negative influence on accuracy. An additional benefit of this magnetic coupling is the extremely low backlash, reducing one of the main weaknesses of sealed encoders.

The fiber-reinforced sealing lips made of fluororubber (Viton) are wear and coolant resistant, allowing the encoder to operate in harsh environments. High velocities are also possible due to the high degree of rigidity and ideally formed blade area of the reading head. The scale itself is fastened via a flexible adhesive film in the profile, which compensates for the differing linear expansion between the glass and the aluminum. Thus a reproducible thermal growth is ensured by symmetrical expansion or shortening of the scale to the profile. Expansion differences between the aluminum profile and machine slide are accommodated by flexible fastening elements.

This new MSA 700 and 800 series is defined as sealed incremental linear encoders that have grating pitches of 20, 10, and eight microns, and come in accuracies of two, three and five microns. This makes them suitable for customer applications requiring precision and protection. They have the same mechanical footprint and electrical properties of the MSA 600 series, and can be customized to suit customer specifications.

### For more information:

RSF Elektronik  
Represented by Heidenhain  
333 East State Parkway  
Schaumburg, IL 60173  
Phone: (847) 490-1191  
[www.heidenhain.com](http://www.heidenhain.com)

## TB Wood's

### OFFERS BELT DRIVE SOLUTIONS

The TB Wood's Engineering Belt Drives Group is a value added resource to its customers. Engineering support activities include evaluation of customer applications to determine if standard or

made-to-order components can be applied, review of customer component drawings for manufacturability, and confirmation of design adherence to industry standards like MPTA, ARPM and ISO. "Our engineers quickly and accurately translate customer information into a delivered belt drive solu-

**continued**



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tion,” said Alex Vevasis, engineering manager, TB Wood’s Belt Drives Group. “By applying our extensive knowledge and understanding of belt drive systems, we effectively shorten our customer’s design cycle.”

TB Wood’s engineers can also provide drive selection assistance by recommending the appropriate product family and the specific drive components for each customer application. A drive detail report is generated which includes performance ratings, installation parameters and a part list. Drives are routinely evaluated and redesigned to provide increased efficiency, enhanced performance and reduced total life costs. To help improve the effectiveness of maintenance teams, TB Wood’s engineering support can also provide product training, including proper installation techniques and problem indicators which can lead to improved system uptime and drive life.



**For**

## more information:

TB Wood’s Incorporated  
440 North Fifth Avenue  
Chambersburg, PA 17201  
Phone: (717) 264-7161  
Fax: (717) 264-6420  
[www.tbwoods.com](http://www.tbwoods.com)

## Tolomatic

### RELEASES HIGH FORCE LINEAR ACTUATOR

Tolomatic’s unique IMA55 high-force servo linear actuator is now available with an optional roller screw that boosts its thrust capability to 6,875 pounds force (30,470 N). In addition, a new compact IMA22 integrated-motor

actuator has been added to the line. The IMA22 features a ball screw and can deliver up to 325 pounds force (1,446 N). Available in four sizes, the IMA line of integrated-motor rod actuators features stroke lengths from three to 18 inches (76.2 to 457.2 mm) at speeds up to 24 inches per second (610 mm/sec). The addition of these two actuators significantly expands the range of applications for these actuators to include pressing,

clamping, valve control, spot welding and volumetric filling. “With the addition of the roller-screw option on the IMA55, the service life of the actuator increases by nearly 10 times in high-force applications,” said Aaron Dietrich, marketing manager, Tolomatic. “The standard ball screw on the IMA22 offers efficiency and economy in lower-force applications that require accuracy, repeatability and durability in a compact package.”



All of the IMA actuators integrate a servomotor and a ball or roller screw for long service life that is designed to fit a multitude of budgets. With its integrated servomotor, the IMA actuator is shorter for a given stroke length than other types of rod actuators. Its patent-pending design allows for easy re-lubrication of the screw without disassembly, reducing maintenance and increasing service life compared to other rod actuators without this feature.

#### For more information:

Tolomatic, Inc.  
3800 County Road 116  
Hamel, MN 55340  
Phone: (800) 328-2174  
Fax: (763) 478-8080  
[www.tolomatic.com](http://www.tolomatic.com)

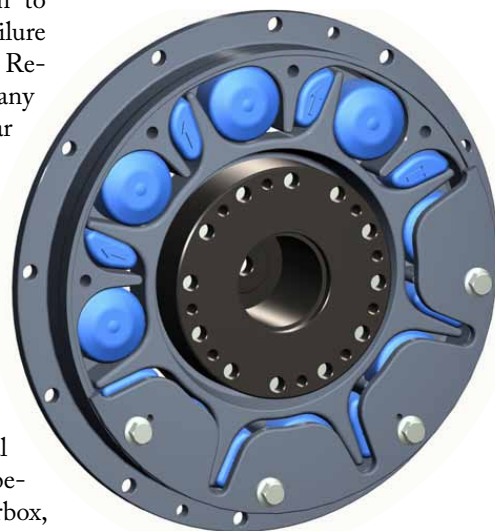
## Renold Couplings

### PREVENT COSTLY EXCAVATIONS

When a large equipment manufacturer needed a long-term solution to protect against costly coupling failure on their excavators, they turned to Renold Hi-Tec Couplings. The company previously used rubber-in-shear couplings which were failing after 4,000 hours of operation. Each time a coupling failed, the excavator had to be stripped down and the coupling replaced. This was proving costly as the excavator runs 24 hours a day, seven days a week and any unplanned downtime means that the cost increases per tonnage of material excavated. The coupling is fitted between the diesel engine and the gearbox, which has three outputs. These outputs

drive three hydraulic pumps, which in turn drive all the motions on the excavator. As these excavators are used on very demanding applications, good coupling life is very important. Renold therefore

**continued**



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recommended the HTB-GS rubber-in-compression coupling. The HTB-GS has already far exceeded the 4,000 hours life of the rubber-in-shear coupling and is still going strong, according to Renold.

## For more information:

Renold Hi-Tec Couplings  
112 Parkinson Lane  
Halifax  
West Yorkshire  
England  
Phone: +(44) 1422 255 000  
[www.renold.com](http://www.renold.com)

## Haydon Kerk

### UPDATES LINEAR ACTUATOR

Haydon Kerk Motion Solutions, a manufacturer of linear motion products, has released a new version of the popular 36 mm G4 linear actuator. This configuration includes a special adapter plate that allows the smaller 36 mm OD unit to replace existing size 17 hybrid stepper motor linear actuators. The 36 mm G4 linear actuator meets the performance of the larger hybrid size 17 single-stack



actuators. The 36 mm unit with the integrated size 17 adapter plate easily replaces existing hybrid units by using the same bolt pattern and pilot surface. Force output range of the G4 36 mm can stack is from 70 N to 260 N (16 lb to 58 lb). Output resolution ranges from 0.013 mm (0.0005") to 0.102 mm (0.004") per step command.

The G4 linear actuator architecture employs the latest technologies to extend reliability and meet higher performance requirements. The design utilizes optimized teeth geometry along with high-energy neodymium magnets that result in a higher continuous force output in a small package. With 20 percent higher output force across the entire speed range, compared with other designs of similar size, the G4 also contains the latest custom-engineered plastics and larger bearings for greater rotor support and higher axial load capability.

The 36 mm linear actuator is suitable for applications that include medical equipment, bar code scanning devices,

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printing equipment, laboratory instrumentation and other mechanisms requiring high force in a small package. As with other Haydon stepper motor linear actuators, there are three configurations available: captive, non-captive, and external linear.

#### For more information:

Haydon Kerk Motion Solutions  
1500 Meriden Road  
Waterbury, CT 06705  
Phone: (203) 756-7441  
[www.haydonkerk.com](http://www.haydonkerk.com)

## Low Inertia Disc Couplings

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Ruland offers both single- and double-disc style couplings for highly accurate systems found in industries such as test and measurement, medical, semiconductor, solar and liquid handling. Disc couplings have low inertia and are torsionally stiff, making them suitable for precise zero-backlash systems with speeds up to 10,000 rpm. Disc couplings are comprised of two black anodized aluminum hubs and multiple flat stainless steel disc springs. Single disc styles are suitable for systems where compact installation is required. Double disc styles add a center spacer to increase the misalignment capabilities. The center spacer is available in a choice of anodized aluminum or insulating acetal for electrical isolation. The thin disc springs allow for a substantial amount of misalignment between shafts, while remaining rigid under torque loads. Par-

**continued**



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allel misalignment is accommodated by the double-disc style or by two single-disc couplings used in tandem. Ruland single- and double-disc couplings are available in both clamp style and set screw style with bore sizes ranging from 3 mm to 30 mm ( $\frac{1}{8}$ " to  $1\frac{1}{4}$ "). Disc couplings are part of Ruland's complete product line, which also includes shaft collars, rigid couplings with precision honed bores and five types of zero-backlash motion control couplings: beam couplings, bellows couplings, old-ham couplings, curved jaw couplings and miniature disc couplings.

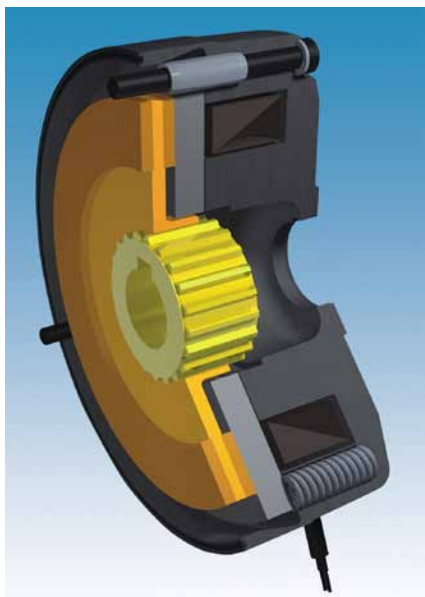
## For more information:

Ruland Manufacturing Co., Inc.  
6 Hayes Memorial Drive  
Marlborough, MA 01752  
Phone: (800) 225-4234  
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## Mayr

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The application of safety brakes in wind turbine pitch drives requires extremely conscientious dimensioning and precise knowledge of braking torque tolerances. If these prerequisites are fulfilled, high-quality brakes will



nance across their entire service lifetime. The pitch drive brakes have the task of securing the rotor blades against twisting once they have been angularly positioned by the gear motors. This rotor adjustment must always function, even if, for example, the power supply has failed. In this case, the motor can be supplied by a battery or capacitor. If no such emergency supply is available for the brake, the motor is designed so that it is capable of turning the rotor blades against the braking force to bring them into a safe position (out of the wind) even when the brakes are applied. Well-founded knowledge of the braking torque tolerances for the brakes used is particularly important in such cases. On the one hand, a sufficient braking torque must be provided to hold the rotors; on the other hand, the maximum motor torque must not be exceeded, so that it remains possible to turn the blades to a safe position against the applied brakes. Of course, this must be ensured in any ambient conditions occurring during normal operation, such as for example at a relative air humidity of > 90 percent or at temperatures well below freezing point. Offshore, mechanical components are subjected to additional strain due to the aggressive, salty air. Mayr Power Transmission has equipped its maintenance-free wind power brake, based on the tried and tested ROBA-stop-M brake, for these tough conditions. Metal surfaces, in particular, had to be protected against corrosion. In addition to rustproof components such as in thrust springs, friction linings especially developed for these applications combined with special non-corrosive counter friction surfaces have proven their worth.

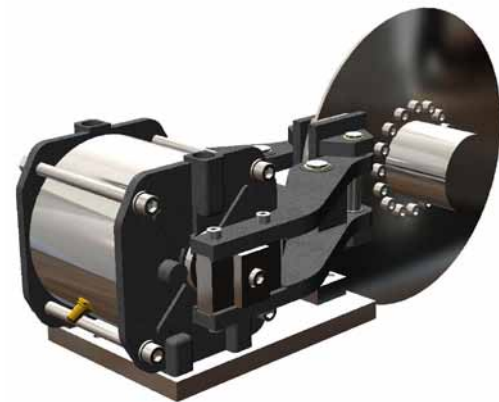
## For more information:

Mayr Corporation  
4 North Street  
Waldwick, NJ 07463  
Phone: (201) 445-7210  
[www.mayrcorp.com](http://www.mayrcorp.com)

## Ogura

### RELEASES PNEUMATIC-STYLE, SPRING-ENGAGED CALIPER BRAKE

Ogura has developed two series of spring-applied, pneumatically released caliper disc brakes. These are the ANB-1100-CP and ANB-2300-CP. The 1100-CP has 11,000 newtons of



clamping force and the 2300 has 23,000 newtons of clamping force. The actual torque applied to a given application is a function of the diameter of the disc. The disc for either brake would be customer supplied.

The new brakes from Ogura have stationary cylinders that make them highly reliable and very resistant to vibration. Even though the brakes can produce a tremendous force, they are relatively lightweight for their size and take up significantly less space than an equivalent single-face brake. They are suitable for wind turbines and railcar shuttle equipment because any time pneumatic pressure is lost, the brakes can come on and hold in an emergency.

## For more information:

Ogura Industrial Corp.  
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With the unique speed reduction mechanism, single-stage ratios range from 6:1~87:1. The physical size of the Darali Cycloidal Drive remains the same from 6:1~87:1, and there is no additional item to be maintained. Double-reduction ratios range from 102:1~7,569:1. Darali Cycloidal Drives come with various mounting (foot, flange, face) and input configurations (shaft-in, C-face, top mount). Sizes are available to handle applications from fractional input hp to more than

½ million (500,000) in-lbs of output torque. Smaller units from size B08 to B12 are packed with maintenance-free grease lubrication. Larger sizes are oil lubricated with provisions of breather, easy drain and sight glass. Spare parts are readily available. Certain spare parts, such as eccentric bearings, can also be used to repair other brands' cycloidal reducers.

### For more information:

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