# Coreless Design

## MAXIMIZES MOTOR EFFICIENCY


Portescap, a Danaher Motion Company, introduces the Athlonix high-power density brush DC motors, which are compact, highly-efficient endurance motors that provide high speed-to-torque performance in a lighter package. The Athlonix motors feature a coreless design with a self-supporting coil and magnetic circuit that provide high power density and prolonged endurance for the motor life. They have an output power up to nine watts, and they are available in 12, 16 and 22 mm frame sizes.

"Athlonix motors are powered by a proprietary self supporting coil, whose design optimization flows from more than 70 years of Portescap research and design. The result is maximized magnetic flux and turn-density for a given diameter, within the Athlonix motor platform," says Udayan Senapati, brush DC product line manager for Portescap. "In contrast, typical self-supporting coils have inherent turn-density limitations that affect the magnetic flux density in the magnetic circuit, which further limits output and endurance of the motor."


The coil design allows for a low motor regulation factor in which energy efficiency is near 90 percent, depending on motor load conditions. The result is a motor that performs better over its lifetime, and the package weight has been reduced to 15–53 grams, depending on the frame size.

"The motor regulation factor, measured by $R/k^2$ where $R$ is the coil resistance and  is the torque constant, is a critical measure of a motor's power density over its performance lifetime," Senapati says. "The lower the motor regulation factor, the lower will be the heat loss at higher loads, thus enabling the motor to retain high power density with sustained endurance. The heat loss from a motor is detrimental not only in terms of reduced efficiency, but it also degrades motor performance over the life of the motor. Superior motor regulation, then, is the key to levels of performance and endurance that set Athlonix apart from conventional technologies."

Athlonix motors have motor regulation factors lower than most comparative motors by 5–20 percent, according to a Portescap press release. The result here is consistent power density over the motors' lifetime. They also are capable of higher throughput than other motors because of the quick acceleration they're capable of.

The Athlonix motors are well suited for applications such as medical analyzers and electronic assembly that require constant pick-and-place operations during machining, assembly and scanning. They are also suitable for medical pumps, secure door locks, watch winding mechanisms and robotics.

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# Wind Turbine Couplings

## PASS "HELL HOLE" TEST

The Composite Disc Couplings from Zero-Max, Inc., designed specifically for the wind turbine industry, feature composite disc packs at each end of a center spacer. The disc packs are patented and offer strength and flexibility to the coupling. They permit a surplus of parallel and axial misalignment, and they stay torsionally stiff through the harmonic ranges of a wind turbine's oscillating load.

"These couplings withstand extreme misalignment while remaining torsionally stiff and have passed the 'hell hole' test at Tehachapi, California wind farm," says James Motz, a member of the Wind Team for Zero-Max.

"The couplings were tested under conditions simulating a 20-year load spectrum of continuous operation. Once fatigue tested, the 'hell hole' location was selected for field testing in a wind turbine whereby the coupling would experience wind conditions in excess

**continued**

of 80 mph with continuous direction changes," Motz says. "The Zero-Max couplings survived these conditions that put over 50 wind turbines not using our coupling out of commission. The Zero-Max coupling continues to operate uninterrupted at this writing."

The coupling's center spacers can be produced from steel, composite glass fiber or 6061-T6 aluminum, depending on the application. They can be engineered to sustain more than 70,000 Nm of torque, depending on the material, by using finite element analysis.

Gearbox damage is averted by eliminating amperage leak through the flex elements electrically insulating the turbine's generator from the gearbox. The coupling protects the generator by shifting lower reaction loads to the generator bearings, and the coupling's composite material survives in extreme environmental elements including temperatures ranging from –57 to 121 degrees Celsius and the moisture and chemicals common to wind turbines.

"Zero-Max has been a leader in design and engineering of wind turbine couplings that outlast the life of any wind turbine built for more than 50 years," Motz says. "Today's Zero-Max's wind turbine coupling technology and facilities have advanced and expanded to serve leading wind turbine manufacturers worldwide with designs that exceed any OEM turbine coupling life requirements."

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## Safety Relay

### MOUNTS INTO PLC RACK

The QS Safety Relay from Mistubishi Electric is incorporated directly into the PLC rack or through direct, high-speed CC-Link for the standalone networked version. The result is detailed intelligence identifying plant safety conditions readily available through the relay.

"This is a major step forward for plant owners and machine operators," says Jeremy Shinton, Q Series product manager for Mitsubishi Electric.

"Typically a manufacturing plant will have a number of safety circuits on it, each with its own standalone safety relay protecting one particular aspect of the process. If one of these circuits trips, the whole plant may be effectively shut down and production lost while engineers inspect the machine or process line looking for the appropriate relay and circuit to identify its cause and correcting the reason before restarting operations.

"The new Mitsubishi intelligent QS Safety Relay addresses this on two levels. Firstly the tripped circuit is instantly identified at the control system. This information can then be visualized by HMI< SCADA or simple panel indicators, which dramatically reduce the circuit search and locate time. Secondly, a history of trips and their causes can be logged and analyzed, leading to identification of recurring issues, which can thus be addressed."

Data from the relays can link into higher level control systems, such as manufacturing enterprise systems (MES), supervisory control and data acquisition (SCADA) and other management information generating systems. The QS Safety Relay supervises eight variables per connected safety circuit, including safety input status, safety output status, safety relay coil status and safety relay contact status. The possible combinations of these result in a diagnostic system that stems

from the control system's assessment of the overall status. Detailed safety circuit status is communicated straight to the control system.

"Most importantly the QS is powered independently from the PLC," Shinton says. "So if the PLC fails it does not affect the safety circuit. This stays independent, protecting man and machine come what may."

Several QS relays can be equipped to a PLC rack, and each supports up to three extension relays, so they can connect to separate field devices like drives, switches, light curtains, interlocks and temperature monitors. The networked CC-Link version is capable of creating smaller standalone groups. This version also supports up to three extension relays, and multiple CC relay stations can be configured. One result is that a safety trip will only shut down that part of the plant.

"We developed QS from listening to what our customers told us in that they wanted something with more intelligence than a standalone safety relay but that a dedicated safety PLC was too specialized and costly," Shinton says. "The fact that installation is as simple as clipping a standard module onto a PLC rack or a DIN rail and that no programming is involved means there is no learning curve to slow take-up."

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## Chokes for Inverters in Wind Turbines

CONSERVE ENERGY

SMP's energy-efficient chokes for inverters in wind turbines are maintenance-free and endure a long service life. Low loss materials and a compact design are responsible for the energy savings features the chokes offer. The SMP chokes have been tested and approved for offshore wind farm usage.

"Today's wind turbines are more efficient than ever before. Until only a few years ago, the maxim for wind power was: it has to be cheap," says Stefan Schauer, technical sales manager at SMP. "The awareness that efficient installations can be highly profitable has grown only over the past few years."

The inductive components provide a high energy storage capacity at low volume, lower losses, good EMC characteristics and cost-effective design. They are built either as single-conductor chokes for high-current applications, individual chokes, choke modules or LC filters, depending on their application.

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## Incremental Encoders

MINIMIZE DOWNTIME

The DFS 60 Incremental Encoders from Sick Stegmann are offered in a fully programmable version that can accommodate any value between 1 and 65,536 pulses per revolution. The programming tool enables system integrators and distributors to choose any number of lines within this range over their PC or laptop computer, and they can set the zero pulse width to 90 degrees, 180 degrees or 270 degrees while programming the electrical interface to HTL or TTL.

The DFS60 determines angles, positions, speeds and accelerations in automation technology. The encoders come in blind hollow shaft, through hollow shaft and solid shaft modes. They are designed with a metal code disc to increase robustness and temperature tolerances. The design permits a 30 mm distance between bearings to reduce vibration and improve bearing life.

The incremental encoders come with an optional pluggable outlet used either as a radial or axial cable outlet to reduce installation depth and allow easier cable replacement.

"DFS60 programmable versions eliminate the need to purchase, stock and prepare machine-oriented line count versions," says Cathy Castle, marketing manager for Sick Stegmann. "As a result, warehousing is simplified and made more cost effective, and downtime is minimized due to the immediate availability of an encoder that is quickly and easily programmed to the user's various requirements."

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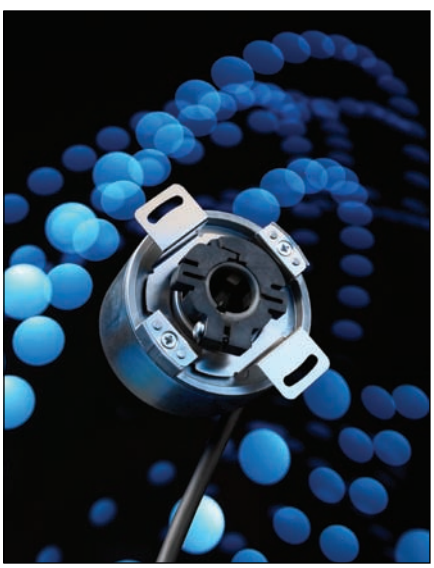

## Bent-Axis Motors

### COMPLEMENT NEW PUMP FAMILY

The first sizes of H1 bent-axis motors from Sauer-Danfoss, 80 $cm^3$ and 110 $cm^3$, complement the recently released family of H1 axial piston pumps. With the bent-axis motors, Sauer Danfoss offers, a complete H1 transmission system focused on electrical control.

"We are pleased to introduce the H1 bent-axis motors, which perfectly complement the successful H1 pump family," says Hans-Peter Nissen, product portfolio manager. "With proven 32-degree bent-axis technology, zero-degree capability and higher overall efficiency, our new motors offer OEMs a number of significant advantages. The H1 propel system provides improved horsepower management and enables advanced anti-slip or wheel-assist control functions."

The H1 bent-axis motors have improved efficiency and a low pressure drop in the galleries to improve fuel economy and free up power for other vehicle functions. "Tier 4 and Euro IIIb emission standards will require intelligent utilization of engine power," Nissen says, "and this will be strongly supported by our new H1 family of products."

By reducing the axis angle to zero degrees, there is no torque interruption or drastic change in speed when the work range is changed to travel range, so the control is more precise. "Zero-degree capability enables OEMs to provide additional features, including accurate anti-slip and torque control functions, which increase vehicle productivity and optimize power utilization," Nissen says. "Even true two-speed applications, for example a crop sprayer, can be supported by this great feature."

The H1 motors were designed around advanced electrical controls to permit various vehicle control concepts to be produced with the same motor hardware. The system can be set to match specific vehicle function requirements by changing the software parameter settings. They are capable of higher speed, which allows a high corner power and power density. As a result, the motors' size does not increase with increased power.

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## Remote Monitoring System

### TRACKS ENERGY USAGE


The HOBO U30/ETH remote monitoring system, from Onset Computer Corporation, is an industrial grade system that monitors energy and provides real-time, remote access to facility energy and environmental data over an Ethernet connection.

Energy and facility managers can apply networked monitoring solutions over the entire facility to track energy usage, HVAC/R systems performance

and green building efficiency. Data collection efficiency is optimized for users to generate long-term, facility-wide energy profiles more affordably.

The HOBO U30 can be set with alarm conditions for any connected sensor, and if conditions exceed the user-defined limits, notifications are automatically sent over e-mail or cell phone text messages.

For outdoor or harsh environmental condition monitoring, the system has a NEMA 6, double weatherproof enclosure. Various sensors are accessible to measure parameters including temperature, relative humidity, kW, kWh, AC voltage, AC amps, DC amps, gauge and differential pressure, $CO_2$ and others. The HOBOlink software accesses current and archived data, sets alarm notifications, relays activations and manages the system from a desktop.

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## Washdown Wheels

### EXTEND BEARING LIFE

Bishop-Wisecarver introduces the newest addition to the DualVee product line, the DualVee washdown wheels, which are designed for extreme conditions of food processing equipment linear motion applications. The wheels extend bearing life and are interchangeable with standard vee wheels in case of replacement. A patent-pending design protects against intrusions of high velocity washdown fluids.

"Applications in washdown environ-

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## Power Up!

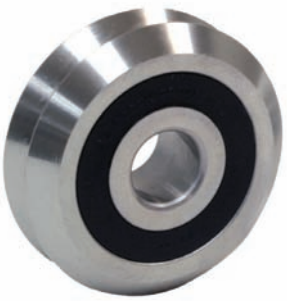
If you have a background in gears, bearings, motors, belts, couplings, sensors or actuators, we'd like to talk to you. Power Play, the back page feature in *PTE*, is all about your industry. If you've got a funny anecdote, an interesting observation or perhaps a limerick on motion control, feel free to send it our way. This column is dedicated to the stories too radical to make the cut in industry or product news. We need story ideas, and we're confident you can provide them.

The rules are quite simple: submit a story idea about the power transmission industry, make it entertaining as well as informative, and become a *PTE* magazine editor-at-large today (salary not included). Submit your award-winning material to *publisher@powertransmission.com.*

ments typically experience frequent bearing replacement due to the ingress of highly corrosive fluids and loss of lubrication," says Nigel Watson, engineering manager at Bishop-Wisecarver. "Dualvee washdown wheels can increase replacement intervals nearly three-fold, resulting in less downtime, higher productivity and lower costs."

The DualVee washdown wheels are constructed from stainless steel and are available in sizes two and three. They feature extra protection from liquids and debris with FDA-approved grease, an outer shield and an inner seal. When a stream of high-velocity washdown fluid comes in contact with the wheels, a rubberized metal shield deflects fluid and conforms to the surface of the wheels, sealing out liquids.

The inner seal provides the most defense against fluids by retaining the internal lubrication grease and further preventing any possible fluid leaking. Any extra fluid between the shield and the seal drains is spun out by centrifugal force.



"With the introduction of this patent-pending design, Bishop-Wisecarver has filled a gap that existed in the bearing market previously for food and beverage applications," says Pamela Kan, president of Bishop-Wisecarver. "We are proud of the inventiveness of our engineering team for providing the answer to this problem, and for, once again, reinforcing our position as the pioneer and industry leader in guide wheel technology."

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