WIND TURBINE SOLUTIONS
Energizing innovations in wind energy – worldwide

ENGINEERING YOUR SUCCESS.
Pressured to meet the demands of a world expected to consume 45 percent more energy by 2030, energy companies are looking for new ways of using renewable energy in a post-carbon world.

Parker has been on the forefront of wind power for over two decades with solutions that touch virtually every critical function in the turbine. From integrated lube oil filtration systems and compact blade actuation systems to sealing technologies and power conversion systems, Parker has the custom, precision-engineered solutions that help the most sophisticated wind power plants generate energy more efficiently, while improving reliability and uptime.

Case in point: Our high-efficiency power conversion systems deliver optimum power to the grid, while our scalable evaporative cooling system lowers overall system cost with up to 40 percent higher power throughput.

**WHY PARKER?**

**REDUCED TIME TO MARKET – GLOBAL SUPPORT**
From concept to production, our ability to manufacture worldwide shortens your design cycle, and improves production efficiency and streamlines procurement.

**GLOBAL PRESENCE – YOUR LANGUAGE, TIME ZONE AND CURRENCY**
Regardless of where you design, assemble, manufacture or install turbines, Parker is there with manufacturing plants, service and support in every major country.

**MULTIPLE-TECHNOLOGY PARTNER**
Proven solutions in hydraulics, filtration, seals, fluid conveyance and power conversion, designed to work in harmony, produce a more efficient and reliable wind turbine system.

**SELECTABLE LEVELS OF INTEGRATION – FEWER SUPPLIERS**
From components to fully-integrated systems, Parker’s broad-based resources give you more options, simplifying your supply chain, lowering development costs and speeding time to market.
CORE TECHNOLOGIES FOR WIND TURBINES

FILTRATION SOLUTIONS
- Interchange filter elements
- Low-pressure/return line filters
- Quantum fiber media elements
- Water removal filter elements
- Portable hydraulic & gearbox oil filtration carts
- High-pressure inline/reverse flow filters
- Desiccant breathers
- Medium-pressure filters

HYDRAULIC SOLUTIONS
- Accumulators
- Pumps & motors
- Electro-hydraulic proportional valves
- Portable proportional valve test box
- Screw-in cartridge valves
- Three-screw pumps
- Air/Oil coolers

FLUID CONVEYANCE SOLUTIONS
- Hydraulic hose
- Thermoplastic hose
- Coolant hose
- Gear oil hose
- Tubing & fittings

SEALING AND SHIELDING SOLUTIONS
- Continuous molded O-rings
- Radial shaft seals
- Bearing isolator seals
- Pitch & yaw bearing seals
- EMI shielding

SYSTEMS SOLUTIONS
- Lube oil filtration system
- Custom hydraulic power units
- Integrated filter manifold block
- Pitch block manifolds
- Non-welded piping
- Electro-hydraulic pitch actuation
- Inertial self-cleaning air filters
- Pneumatic diaphragm pumps
- Coolant evaporation inhibitor

CONDITION MONITORING AND ADVANCED DIAGNOSTIC SOLUTIONS
- Wireless sensors
- Online sensors
- Diagnostic test equipment
- Field oil test equipment
- Particle counters & analyzers
- Pressure switches & controllers
- Test points
HYDRAULIC SOLUTIONS

PISTON

Parker piston accumulators offer several unique advantages: customization, high durability with extremely low gas permeation rates, and USA-made, with additional manufacturing in Europe, for best-in-class lead times. They are crimped to 6" (150mm) bore, available up to 22" (559mm) bore threaded and up to 20,000 psi (1379 bar). These high-speed pistons perform in temperature ranges from -45°F to +320°F (-42°C to +160°C).

ACCUMULATORS

VANE PUMPS

Parker vane pumps are offered in variable displacement and single, double and triple fixed displacements. The Denison T Series fixed-displacement vane pumps are high-pressure, high-speed designed to accommodate high flows within a small envelope.

AXIAL PISTON PUMPS AND MOTORS

Parker axial piston pumps and motors are available in fixed and variable displacement options with exceptional features, including high-strength cast-iron housings, modular controls and smooth rotation.

GEAR PUMPS AND MOTORS

Parker electric motor-driven gear pumps feature a helical gear design with geometrical displacement of 50 cm³/r to 118 cm³/r. A cast-iron construction ensures performance in harsh conditions. Even with high-viscosity oils, Parker gear pumps provide excellent suction.

BLADDER

The Parker bladder-style accumulator is the industry’s original and maintains the highest quality because of our in-house bladder-molding operations. Five bladder compounds to suit a wide variety of fluids and temperatures. Certified to ASME VIII-Div. 1. 1-gallon (3.8L) to 15-gallon (56.8L) sizes with flow rates up to 600 gpm (2271 lpm).

GLOBAL BLADDER

Parker’s newly developed global bladders with E2 material are now a standard catalog product engineered to meet all global certifications. In-house manufacturing enhances quality and performance. They combine the best performance qualities of Olaer and Greer designs, and require only 5 days’ lead time for delivery.

DIAPHRAGM

The Parker ELM gas-charged high-pressure diaphragm accumulators are designed to be compact, lightweight and PED-compliant for wind turbine braking systems and energy reserve for emergencies. 2,030 psi to 5,076 psi (140 bar to 350 bar), 0.02-gallon to 0.92-gallon (.075L to 3.5L).

REPAIR KITS AND ACCESSORIES

Parker provides bladder repair, safety blocks and charging kits.

PUMPS AND MOTORS

A comprehensive range of pumps and motors for a variety of needs: gear pumps and motors, radial piston pumps, and vane pumps.

GEAR PUMPS AND MOTORS

Parker electric motor-driven gear pumps feature a helical gear design with geometrical displacement of 50 cm³/r to 118 cm³/r. A cast-iron construction ensures performance in harsh conditions. Even with high-viscosity oils, Parker gear pumps provide excellent suction.

VANE PUMPS

Parker vane pumps are offered in variable displacement and single, double and triple fixed displacements. The Denison T Series fixed-displacement vane pumps are high-pressure, high-speed designed to accommodate high flows within a small envelope.

HYDRAULIC MOTORS

Parker hydraulic motors are engineered in fixed and variable displacement options.
Parker’s advanced direct operated proportional control valves are specifically designed for high-response, closed-loop controls. The **D1FC** (nominal size NG06) and **D3FC** (nominal size NG10) combine a highly compact external footprint with onboard digital electronics, integrated position control technology and separate enabling of solenoids to provide high dynamics and high flow rates.

**Features that make a difference:**
- Rugged electronics design = Rubber-mounted board with conformal coated electronics in a robust, sealed metal enclosure
- All fasteners are secured with threaded locking material = Long, reliable service in high-vibration environments
- Factory preset = Valve-to-valve interchangeability
- Latest generation of digital onboard electronics = The LVDT is completely integrated into the housing for high reliability; therefore, it does not require an exposed cable connection
- Low hysteresis = Repeatability
- Position feedback sensor positioned directly on the spool = Continuous and precise measurements for high accuracy in blade pitch control

Parker also manufactures a wide range of screw-in hydraulic cartridge valves.

Parker three-screw pumps are positive displacement axial pumps designed to manage both high- and low-viscosity fluids up to 1,450 psi (100 bar) in oil circulation, cooling and filtration. They can be used with a variety of fluids including mineral oil, synthetic fluids, lubrication oil and fuel oil.

The three-screw pump’s compact design has only three rotating parts and one shaft seal. It offers extremely low noise and pulsation, with high flow capabilities up to 1,320 gpm (4997 lpm). It is manufactured according to API 676.

The **Valve Master® EX00-M05 Series test unit** is suitable for testing and commissioning all proportional and servo proportional valves with onboard electronics across the hydraulics industry. For easy on-site service, all necessary cables are securely located inside the rugged case. **The Valve Master** design provides all command signal sources and measuring ports for quick and easy control and diagnosis of the valves.

Parker offers a wide range of coolers. The **MAC air/oil cooler system** is based on the existing proven concept of the **LAC series** but has been further developed to withstand the most challenging environments. It is engineered for marine nearshore and offshore applications and provides cooling capacity up to 300 kW. Corrosion resistance meets CA-M and CS5-M requirements in accordance with ISO 12944. A clever design and the right choice of materials and components produce a long useful life, high availability and low service and maintenance costs.
Parker’s latest quantum fiber media provides a reduction in pressure drop while increasing the filtration efficiency at higher differential pressures compared to previous-generation products. These improvements optimize the overall performance of Parker filtration while extending element life, making it ideal for wind turbine systems where access is difficult and demand to lower the cost of ownership is paramount. Available in 2, 5, 10 and 20 micron rating.

Parker’s ParFit™ hydraulic and lube oil filter elements are designed to upgrade any filtration system with the industry-leading media that is optimized for long life in wind turbines of all sizes. The leading dirt-holding capacity, lowest pressure drops and high beta ratings of ParFit™ elements ensure a clean lube oil supply to the gearbox while minimizing replacement intervals. A wide range of elements allows for the consolidation of purchases and better inventory management.

Parker PT Series low pressure return line filters combine high efficiency quantum fiber filtration with low cost installation in a newly patented element design. Easily removed for maintenance, these filters offer both convenience and dependability.

Used in combination with particulate filters, Par-Gel water removal filter elements provide significant benefits: less component wear, reduced downtime, improved machine productivity, less replacement and disposal of contaminant fluid, and reduced risk of catastrophic failure.
PORTABLE HYDRAULIC AND GEARBOX OIL FILTRATION CARTS

**WGC Series Gearbox Cart (3.8 gpm)**

**WHC Series Hydraulic and Lube Oil Cart (10 gpm)**

Parker’s wind filter cart family is designed specifically to fit into all major turbine manufacturers’ nacelles. Built within a robust and enclosed frame, the hydraulic and lube cart’s flow rates are optimized to minimize the amount of time required to achieve system cleanliness. These cleanliness targets are easily identified with an optional integrated particle counter. This product comes standard with a visual differential pressure indicator. Going up-tower is made easier with the fully rated hoist ring included on every cart.

DESSICANT BREATHERS

To maintain peak productivity and efficiency, Parker TriCeptor desiccant breathers prevent moisture and particulate contamination from entering the reservoir.

Parker’s Mobile TriCeptor is equipped with check valves to extend the life of the desiccant, opening only when an exchange of air is required. Silica gel absorbs water from incoming air, and during exhalation, dry system air is passed through the silica gel bed, partially regenerating the desiccant.

HIGH PRESSURE REVERSE FLOW FILTERS

Our world pressure filters (WPF) remove particulates down to 2 microns at operating pressures up to 7,000 psi (483 bar). They feature an integral indicator and bypass with coreless element assembly for ease of disposal. A proprietary SurgeGuard System protects from backflow risks, while patented deformable tangs allow automatic element locating for fast, safe, and clean removal.

MEDIUM-PRESSURE FILTERS

Parker’s industrial high-flow gear box lube oil filters provide optimum performance in areas of flow vs. pressure drop, dirt-holding capacity and efficiency. Long life construction maximizes element service intervals while protecting critical lubrication system components. Ergonomic design allows for safe, quick and easy service. Magnetic pre-filtration is available, allowing the user to quickly identify any accelerated component wear. Porting and materials of construction can be customized to meet demanding requirements.

AIR FILTER CARTRIDGES

Parker also offers a variety of spin-on air filter cartridges, as well as magnetic suction strainers.
CONDITION MONITORING AND DIAGNOSTICS

WIRELESS SENSORS

Parker SensoNODE Gold™ is a series of networked wireless sensors developed for continuous condition monitoring for use with cloud or local applications. The sensors monitor assets for changes in pressure, temperature, humidity, flow and power.

SensoNODE Gold 900 Mhz sensors include simple operation, long-life battery, low power usage with long-range capabilities. Sensors easily connect to our SCOUT software platform.

SESONODE GOLD™

Parker’s SCOUT software is a suite of condition-monitoring, diagnostics and analytics software. With an easy-to-use interface and compatibility with mobile devices, SCOUT puts vital information and analytics in-hand to help keep systems healthy and operating efficiently.

SCOUT Cloud is Parker’s cloud-based conditioning monitoring software that provides alerts, status and analytics. It provides mobile awareness of processes and assets anytime, anywhere. SCOUT Cloud allows for remote monitoring of multiple sites and sensors, multiple users and access from any browser.

ONLINE SENSORS

METALLIC WEAR DEBRIS
Detects size, distribution and count of both ferrous and non-ferrous debris particles.

MOISTURE
Provide fast, reliable and accurate detection of moisture in fluids.

FLUID PROPERTY
Sensors measure viscosity, density, dielectric constant and temperatures of fluids.

OIL CONDITION
Detection of oil aging and contamination of oil.
CONDITION MONITORING AND DIAGNOSTICS

FIELD OIL TEST EQUIPMENT

Field test equipment enables on-site testing, eliminating the need to go to the lab. The DIGI field test kit measures Total Acid Number (TAN), Total Base Number (TBN), viscosity, water-in-oil and insolubles.

For complete analysis, Parker’s offers ParTest fluid analysis. Parker will supply you with a fluid container, mailing carton and appropriate forms to identify your fluid and its use. An independent lab performs complete spectrometric analysis, particle counts, viscosity and water content. Results are sent directly to the requester.

PARTICLE COUNTERS AND ANALYZERS

The Parker icountPD transmits oil cleanliness by ISO code through LED or digital display indications for low, medium and high contamination levels.

The icountOS portable oil sampler provides ISO and NAS code cleanliness reporting for real-time detection of both particulates and dissolved water down to 4 microns and is available with Wi-Fi.

The icountLCM20 portable particle counter provides particle counts for 6 channels, multistandard ISO and NAS code cleanliness reporting, data entry, data graphing and integral printing (all standard).

PRESSURE SWITCHES

The Parker SensoControl™ SCPS01 electronic pressure switches have been designed with EMC characteristics, shock resistance and vibration resistance so that they can be used in a wide variety of wind turbine applications. In order to reduce the complexity of installation for the customer, the pressure switch can be programmed with customer-specific values at the factory, eliminating the need to make time-consuming adjustments while the system is pressurized.

The solid state pressure switch contains no moveable parts. All components exposed to the outside environment are made from stainless steel.

PRESSURE CONTROLLER

The SensoControl™ SCPSD pressure controller combines the functions of a pressure switch, a pressure sensor and a display device into one easy-to-use device.

- Pressure gauge (manometer)
- Switching outputs
- Analog signal

Our housing is made of metal and is resistant to moisture, shock and vibrations. The electronics are protected against reverse polarity, over-voltage and short circuits.

DIAGNOSTIC TEST POINTS

Parker SensoControl™ test points are engineered for pressure monitoring, checking and taking samples on high, low and negative pressure systems. They can also be used for bleeding cylinders and hydraulic systems. They offer a leak-free connection before the valve is open, easy handling, and coupling pressure up to 5,802 psi (400 bar) with screw couplings, nominal pressures up to 9,137 psi (630 bar). Available in Parker’s proprietary Chromium-6 Free finish.”
Parker manufactures nonconductive hoses for low-medium- and high-pressure applications. When compared to wire-reinforced rubber hose or even metal tubing, thermoplastic hose offers a significant added value. Thermoplastic provides extreme chemical compatibility, noise-level reduction, and ultraviolet and corrosion resistance, while fiber reinforcement retains flexibility—even at low temperatures.

Parker has the most comprehensive range of hoses and fittings for all fluid handling applications on wind turbines—hydraulic fluid, lube oil, gear oil, water/glycol and generator/inverter coolant. Designs exceed performance and reliability standards.

<table>
<thead>
<tr>
<th>HYDRAULIC HOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parker GlobalCore provides a simple solution of robust hydraulic hoses designed for high-pressure applications. With five hoses and two fittings, GlobalCore significantly reduces inventory and part number complexity.</td>
</tr>
<tr>
<td>Tested up to twice the ISO 18752 standard, GlobalCore is an anytime, anywhere solution engineered to endure the toughest conditions for the longest service life possible. GlobalCore constant working pressure hoses are available in the following pressure ratings: 3,000 psi (207 bar), 4,000 psi (276 bar), 5,000 psi (345 bar), and 6,000 psi (414 bar).</td>
</tr>
<tr>
<td>GlobalCore cover options (rated to -40°F/-40°C) include Standard, ToughCover and SuperTough, which is 450 times more abrasion-resistant than the Standard cover.</td>
</tr>
<tr>
<td>With manufacturing locations in all the major global regions, GlobalCore supports your hose needs, regardless of where your equipment was manufactured, with a single cohesive family of complementary products. For extreme cold, Parker offers low temperature hose rated as low as -70°F (-57°C).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>THERMOPLASTIC HOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parker manufactures nonconductive hoses for low-medium- and high-pressure applications. When compared to wire-reinforced rubber hose or even metal tubing, thermoplastic hose offers a significant added value. Thermoplastic provides extreme chemical compatibility, noise-level reduction, and ultraviolet and corrosion resistance, while fiber reinforcement retains flexibility—even at low temperatures.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COOLANT HOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super-Flex® EPDM water suction hose is designed to handle glycols and water in wind applications. The hose construction incorporates a wire helix to provide full suction and discharge capability, as well as kink resistance. The EPDM cover is resistant to abrasion, heat, chemicals and weathering.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GEAR OIL HOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervino GIHS Series hose is used for suction and delivery of mineral oils and fuels. The proprietary compound mixture makes the hose especially well-suited for outdoor applications, when low-temperature performance is required. Product is compliant with EN12115.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HOSE-FLUSHING CAPABILITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parker has in-house capabilities to provide oil-flushed hose assemblies that meet Turbine OEM ISO code cleanliness specifications.</td>
</tr>
</tbody>
</table>
**FLUID CONVEYANCE SOLUTIONS**

**INSTRUMENTATION TUBING**

Parker provides seamless instrumentation tubing in both inch and metric. Available in stainless steel, Parker tubing is the gold standard for durability and value.

**O-RING FACE SEAL FITTINGS**

Parker’s O-ring face seal fittings have been designed for applications with higher impulse pressures and vibration, offering leak-free connections up to 9,000 psi (620 bar) in a wide range of temperatures. Their patented trapezoidal seal, available on both Seal-Lok™ and O-Lok® fittings, allows for maximum O-ring retention in a precisely engineered Captive O-Ring Groove (CORG). This competitive advantage increases assembly productivity and offers maximum assurance of a leak-free connection, avoiding operational and maintenance costs.

**METRIC TUBE FITTINGS**

Parker offers a complete variety of both steel and stainless steel tube-fitting solutions.

- **EO-3 fittings** enable fast, easy, simple and more secure installation by incorporating a new thread technology. EO-3 fittings feature an indicator ring that makes correct assembly plainly visible.

**STANDARD TUBE FITTINGS**

Parker offers a complete variety of both steel and stainless steel tube-fitting solutions.

**NON-WELDED PIPING SOLUTIONS**

- **Parker’s non-welded piping systems** provide a substantial reduction in total welds. Available from 1 13/20” (42mm) to 10 3/4” (273mm) pipe.

- **Parker Complete Piping Solutions (CPS)** are now ASME B31.1 and B32.3 code-compliant and offer additional advantages: shorter prefabrication time leading to faster total installation, no “hot works” open-flame permit requirement, reduced flushing time and costs, and no post-welding cleaning costs.

**COMPRESSION FITTINGS**

Parker manufacturers both A-lok™ two-ferrule and CPI™ single-ferrule compression fittings.

**QUICK DISCONNECT COUPLERS**

Parker quick disconnect couplers are designed for low, medium and high pressure. Their operating range is from -40°F to +250°F (-40°C to +121°C).
The Parker Velcon TDS® transformer dry-out system allows a transformer to remain in service while moisture is effectively removed for its insulation. The system is safe. Several alarm features shut the system off, isolating it from the transformer in the event of any abnormal signal. The TDS5-1 unit provides a nonintrusive, cost-effective and convenient method of keeping transformers dry.

Parker Velcon Superdri® water removal cartridges remove dissolved water from transformer oil. Dissolved water removal from insulating oils to less than 5 ppm is now possible without the need for heat and vacuum oil processing systems.

The Parker Velcon transformer oil filtration trailer is a complete system with a trailer, oil storage, a pumping system and hose reels.

Our wheel-up, portable Sentinel™ purification system provides on-demand reservoir dehydration/purification wherever needed. With a flow rate of 5 gpm (19 l/min), the system periodically turns on and measures water content, automatically runs dehydration cycling if necessary, and shuts off without an operator being present. Once fluid attains the necessary dryness, the system will return to full power Sentinel™ mode.

Parker Velcon Aquacon AC series removes free and emulsified water to less than 2 ppm from insulated oils.
A critical component of any energy storage system is the Power Conversion System (PCS).

The PCS is used in a variety of storage systems and is the intermediary device between the storage element, which is typically large banks of (DC) batteries, and the (AC) power grid.

Power Conversion Systems depend on proven, reliable inverter technology. Parker has spent more than 35 years designing and manufacturing inverters for the wind turbine industry. Our bidirectional inverter designs efficiently channel energy into storage elements and retrieve stored energy for fast delivery on-demand to the power grid.

Parker EGT has extensive experience in energy storage and can offer a number of technologies and systems for a wide range of architectures.

Drawing on four decades of work in power electronics, the Parker bidirectional grid tie inverter is the heart of the energy storage Power Conversion System. The PCS regulates the transfer of power between the grid and the storage element of your choice. Most commonly, the storage element is a bank of batteries. The Parker PCS is adaptable to any battery chemistry.

To make easy work of installation and commissioning, Parker offers preconfigured indoor- and outdoor-duty PCS designs. Included are the modular inverters, connection points, climate control and communication. Depending on the desired configuration, the Parker PCS can control up to 2 megawatts each.

Parker’s long-established expertise in system integration is now being translated into turnkey battery containers for energy storage systems. Configured to customer and application requirements, the fully integrated containers are delivered and installed on-site. These containers can be configured for air, water or closed-loop evaporative cooling. They include racks ready for batteries, DC bus bar distribution, low-voltage wiring, fire suppression and precision-cooled thermal management.
PARKER SYSTEM SOLUTIONS

_parker_ system solutions are truly comprehensive, from a thorough variety of standard solutions to completely customized systems._

**LUBE OIL FILTRATION SYSTEM (LOFS)**

Lube Oil Filtration Systems from Parker are fully integrated systems based on customer specifications for high viscosity oil applications in different levels. These systems offer total gearbox health management with integrated real-time condition monitoring devices.

**GEARBOX FILTER MANIFOLDS**

Parker filter manifolds with integrated pressure and temperature control valves reduce the space required, weight and number of fluid connections (leak paths).

**BEARING LUBRICATION VENTILATION SYSTEM**

Wind turbine main bearings operate at atmospheric pressure using a ventilation circuit in the lubrication system. Parker T2-01 DC low-pressure, high-flow pneumatic diaphragm pumps are highly efficient and compact, for high-capacity fluidics applications up to 15 gpm (60 lpm). An ideal solution to prevent occlusion of the ventilation system and to eliminate costly turbine downtime for servicing bearing grease.

**WIND TURBINE PITCH CONTROL MANIFOLD BLOCK**

As the global leader in Motion & Control technologies, Parker Hannifin can design and manufacture complete pitch control manifold systems to work in harsh wind turbine conditions and provide optimal performance from the turbine blades.

**PARKER ADVANTAGES:**
- Compact design to save weight and envelope size using Parker threaded cartridges
- Circuit design for maximum efficiency, including reduced pressure drops and improved damping for long actuator life
- Designed for harsh environments with plated manifolds and ruggedized components
- Precise control from our D*FC series proportional valves
- Circuity designed for safe power-down
- Designed to work with voltage, current or field bus input

**COOLANT EVAPORATION INHIBITOR FOR 1.5 MW WIND TURBINE OPEN-LOOP COOLING SYSTEMS**

The correct water/glycol coolant mixture and levels in the insulated-gate bipolar transducer (IGBT) circuit are a critical issue. Water evaporation elevates the mixture’s viscosity, prohibits cooling ability and compromises the IGBT and associated electronic controls. Parker’s Kleenvent KV-CEI unit eliminates water evaporation in the coolant solution and stops ingress of airborne contaminants by closing off the cooling loop from the outside atmosphere using breather bladder technology. It prevents the need for continuous coolant monitoring during the warm season for a return on investment in as little as one year.

**YAW, BRAKE AND PITCH CUSTOM HYDRAULIC POWER UNIT (HPU)**

Parker custom HPUs are uniquely engineered for wind yaw and brake applications.

- Compact design to save weight and envelope size using Parker threaded cartridges
- Circuit design for maximum efficiency, including reduced pressure drops and improved damping for long actuator life
- Designed for harsh environments with plated manifolds and ruggedized components
- Precise control from our D*FC series proportional valves
- Circuity designed for safe power-down
- Designed to work with voltage, current or field bus input
PITCH SYSTEMS (EHA)

Parker offers several hydraulic pitch configurations. Having the design of all essential parts in-house, we are able to optimize our system solutions by making customized adjustments down to component level. This globally available competence directly paved the way to the development of the next generation pitch system: our Electro-Hydrostatic Pitch Actuator (EHA). It combines the benefits of electromechanical and hydraulic actuation. A robust speed controlled pump is directly controlling the position of the pitch actuator, which can be a cylinder or a hydraulic motor. The EHA-Pitch reaches higher efficiencies than conventional hydraulic pitch systems, eliminates coolers and is delivered in two ready-mounted packages per blade. Mounted within the hub, it’s compact in comparison to electromechanical pitch actuators yet has the robustness and energy back-up with the addition of hydraulic accumulators.

Additional Parker features can be incorporated, such as condition monitoring sensors, predictive maintenance algorithms to the pitch controller, or simply the blade lock function. The EHA approach can also be used to actuate the Yaw. Together with our certified partner, Parker can offer guidance through the certification process of our customized pitch system solutions.

INERTIAL SELF-CLEANING AIR FILTERS

The Parker Farr Dynavane is a compact, self-cleaning, inertial separator. It is designed to handle large volumes of air at high velocities, while operating at a constant airflow resistance. The Dynavane incorporates inertial separation, providing high dust removal efficiency of airborne particulate matter.

Extensive testing under laboratory and field conditions has proven the Dynavane to be one of the most effective high-volume air cleaners for use in single- and multistage-filtering systems.

Standard, pre-engineered Dynavane assemblies are available in sizes operating from 500 CFM to over 250,000 CFM while a custom engineered model can be designed to suit our customer’s needs. Multiple units can be combined to handle even greater air volumes with minimal space requirements.

Monoclone self-cleaning, inertial air cleaners are recommended where dust concentrations are extreme or where service work must be minimized. Monoclone inertial separators are highly efficient as a primary air filtration device or as a pre-cleaner for high-efficiency secondary filters.

Monoclone panels can be configured in almost any arrangement, allowing them to match both the physical layout and airflow requirements of any system. The construction gives the Monoclone an excellent structural resistance and a unique adaptability to needed shapes and performances.

INSTALLATION SOLUTIONS

COMPOSITE ASSEMBLY TOOLS FOR WIND TURBINES

Parker’s patented ultralight Lightraulics® composite hydraulic tool cylinders cut time on-site, boost productivity, reduce the need for mechanical handling and enhance operator safety. In place of traditional heavy steel cylinders, which cannot be moved without assistance and are difficult to locate accurately, Lightraulics® hollow piston cylinders are built from corrosion-resistant lightweight alloys and carbon fiber composite materials, and are available in tie rod or roundline design. Weighing typically between one-third to one-quarter of a comparable steel cylinder, they can be positioned quickly and easily—often by a single operator. The result: higher productivity, savings in time and manpower, and a reduced risk of injury. All tool cylinder series are available in lifting loads ranging from 50 to 500 tons, with stroke lengths up to 300 mm.
PARKER Pitch and Yaw Bearing Seals

Parker’s sealing and shielding capabilities include a unique combination of manufacturing expertise, materials experience, innovation and engineering excellence to create efficient solutions for today’s wind turbines.

**PITCH AND YAW BEARING SEALS**

Parker pitch and yaw bearing seals and environmental seals are engineered to reduce friction, improve pressure resistance and increase the systems operating efficiency.

Pitch and yaw bearing seals are made from specialized materials: FKM, NBR and HNBR. They resist wear, grease and ozone. Their highly engineered extruded profiles are designed for pressure resistance and torque optimization. Available in long lengths or bonded into rings with a high-strength, hot-vulcanizing process.

**EMI SHielding**

Parker Chomerics EMI shielding and coatings can be found in many OEMs and their suppliers’ electrical and electronic systems on wind turbines. Optically enhanced display screens, EMI shielded low-profile and closure force materials and tapes, optical filters, conductive elastomers and fabric over foam gaskets all form an integral part of control cabinets. Conductive coatings and adhesives are critical in ground fault and lightning protection of key components and structural elements.

**Hollow Tube Enclosure Seals**

Hollow tube enclosure seals are extruded gaskets with a low closure force and a low compression set. Durable construction ensures a long life. With mechanical fasteners and friction fit grooves, they provide multiple attachment options.

**Continuous Molded O-Rings**

Parker Continuous Molded O-Rings enhance large diameter O-ring performance. They feature a proprietary continuous molding technology to ensure strength and reliability. Parker’s process eliminates spliced joints. Available in standard and custom O-Ring sizes.

**Radial Shaft Seals**

Parker Radial Shaft Seals are manufactured in diverse materials: rubber, PTFE and TPU. They are split for service. The non-metallic radial sealing element is a composite OD, rubber/Kevlar®.

This composite will not rust or corrode and accommodates a wider range of bore tolerances and imperfections, along with low cost tooling. The flexible hinge allows for high misalignment and vibration. Molded chamfer and composite OD facilitates easy installation.

**BEARING ISOLATOR SEALS**

Parker ProTech® bearing isolator non-contacting labyrinth seals statically seal on the shaft with the O-ring, so the rotor will spin with the shaft. It creates a controlled gap at the rotor/stator interface, which restricts contaminants. At the drain port, centrifugal force and gravity expel contaminants out of the seal. Internal oil grooves direct oil splash back into the sump. All of which extends service life and improves system efficiency. Parker ProTech® self-grounding bearing isolator seals dissipate shaft electrical charges, reducing shaft voltage and preventing bearing pitting.

**Emission Control Systems**

Parker’s sealing and shielding capabilities include a unique combination of manufacturing expertise, materials experience, innovation and engineering excellence to create efficient solutions for today’s wind turbines.

**Hollow Tube Enclosure Seals**

Hollow tube enclosure seals are extruded gaskets with a low closure force and a low compression set. Durable construction ensures a long life. With mechanical fasteners and friction fit grooves, they provide multiple attachment options.
The Parker Tracking System is an innovative component tagging and asset management solution available in 50 countries worldwide. The system markedly increases uptime by providing fast and accurate product information to speed replacement, regardless of where or when the component was created or installed. Whether it’s a pump, hose, filter or any product, tagged components can be replaced sight unseen, so PTS eliminates the wait for removal before the new part can be acquired.

PTS produces clear and dynamic product identification, providing a critical link to the digital record where product-specific data is stored. Because products are used in a variety of challenging environments and conditions, durable tagging media must ensure precise readability. In terms of maintenance and inspection, industry and governmental regulations are forcing businesses to be more aware of their own record-keeping. The PTS system enables users to establish inspection and/or replacement dates to drive proactive maintenance planning. This optimizes equipment use and ensures compliance. PTS hardware and software use the latest in cloud technology, so data can be securely accessed from any internet-connected device. Generating custom part labels can be quick and easy with compatible hardware kits personalized for each customer site.

PTS Pro brings together advanced asset tracking/management capabilities with Parker’s global network of distributors and service partners. With PTS Pro, you can establish detailed asset location data, create custom inspection templates, schedule inspections and replacements, apply application and related data to an asset group, transfer record ownership between PTS accounts, store and retrieve historical inspection results, and export asset details into spreadsheet reports.

Hose repair has never been so easy with the ParkerStore Hose Doctor mobile hose repair solution. Parker will have trained professionals come to your site with a fully stocked truck to identify, diagnose and replace hose assemblies on hydraulic and pneumatic systems. Backed by our global network of over 1,000 vehicles, we’re available anytime, day or night, for your service and repair needs.