Filtration Solutions for Power Generation

The protection you need for improved performance

Parker

ENGINEERING YOUR SUCCESS.

Keeping power generation assets protected

Advanced filtration technologies and systems that deliver the availability, flexibility, sustainability, reliability, and profitability you need.

AVAILABILITY:

WORLDWIDE. AND WORLD RENOWN.

With 50,000 employees serving 500,000 customers in almost 50 countries, Parker is literally everywhere you need us to be. By working with us, you have access to an integrated network of 316 manufacturing plants, 13,000 distributors and MRO outlets, and over 1,500 ParkerStores. Not only that: our technicians and market-specific engineers are ready to help you with system or subsystem design, on-site or off.

FLEXIBILITY:

SYSTEMS THAT OPTIMIZE VALUE

As the world's motion control expert, Parker offers you a complete range of proven filtration products. Engineered to work together, these products deliver streamlined systems and subsystems with exceptional quality and durability. Whether for wind turbines ... or gas combustion and diesel fuel power plants ... our filtration systems reduce costs and advance performance. Cleanly, Efficiently, and Reliably.

Want to know more about filtration solutions for power generation and other emerging technologies? Call 1-800-C-Parker. International customers call 00800 27 27 5374.

SUSTAINABILITY:

PROTECTING PEOPLE AND ENVIRONMENT

Parker can help you meet the need for fuel-efficient, low-emission, high-performance energy. Our advanced technologies and innovations improve emissions performance, minimize waste, meet environmental regulations, monitor air and water quality, offer longer life, and help create greater fuel efficiency.

PROFITABILITY:

LEAN AND CONTINUOUS

At Parker, we actively seek new and better ways to do things as part of our mandate for continuous improvement. Committed 100% to total support, we partner with our customers to focus on creating solutions that are smaller, lighter, more energy efficient, and highly reliable, as well as cost effective. And we offer services that reduce outage times and operational costs, such as:

- **Custom kits:** With materials organized by order and quantity, these single part-number kits streamline procedures, reduce assembly time, and lower costs.
- **An international network of support facilities:** To meet emergency needs and reduce downtime.
- **Vendor-managed inventory:** Including custom-tailored bin-filling programs managed by us.

RELIABILITY:

NATIONAL AND INTERNATIONAL CERTIFICATIONS

Our certifications verify that our systems and solutions offer the highest possible quality for the most efficient performance. These include:

ASME: Codes and standards set by the American Society of Mechanical Engineers.

ATEX: Covering equipment operating in mines or potentially explosive gas, vapor, or air/dust environments.

CE: Indicating that a product has met EU consumer safety, health, or environmental requirements.

CSA/CRN: Shows product has been tested and meets applicable national standards in the U.S. and/or Canada.

FM: Assures customers a product or service has been tested and conforms to the highest national and international standards.

N Stamp: Quality assurance of construction materials, design, operation, inspection, and continuing maintenance of nuclear facilities.

PED: Certifying pressure equipment and assemblies.

PM: Globally recognized certification of project management expertise.

UL: An independent product safety certification.

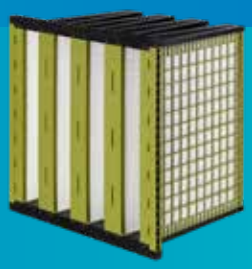
COMBUSTION TURBINE

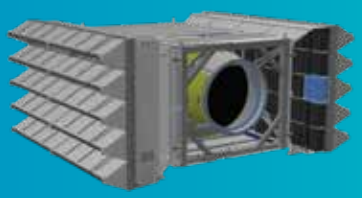
Parker has been at the forefront of combustion turbine technology from the earliest high-performance jet engines to today's most demanding power generation applications. Over five decades of experience have given us wide ranging expertise in systems and components for fuel and water atomization, fuel controls, emission controls, and condition monitoring ... all driving turbine efficiency rates. By working with Parker, you'll benefit from sustained engine performance with higher MW output, the lowest maintenance costs, extended engine and component life, reduced operating costs, and lower emissions due to greater fuel-burning efficiency.

Altair clear**current** Pro Static VCell Filters

Improve operating costs while improving your power output. By incorporating elements of degradation-based maintenance, our clear**current** filters help power plant operators meet their desired performance goals.

The clear**current** PRO filter is fleet validated, with compressor health improvements showing increased power output and lower heat rate with level pressure loss. Protecting against both dry and wet contaminants reaching the gas turbine compressor blades, Static VCell Filters with PRO technology deliver predictable performance while maintaining steady pressure loss throughout filter life.





Filter house

Altair clear**current** GC Coalescer Filters

The GC coalescer is designed to meet a wide variety of configurations, and is engineered for easy installation and replacement.

Its unique, lightweight construction supports quick and easy filter change out, which is an important aspect of proper inlet house maintenance. The GC provides a first line of protection when paired with high efficiency final filters in a multi-stage inlet filtration design. Constructed from glass fiber media, the clear**current** GC coalescer remains optimized when operating in wet conditions. Greater density of the media at the back supports full depth operation and offers a long service life

Key Benefits

- Excellent fine mist/fog coalescing efficiency, designed for coastal areas and harsh conditions
- Low pressure drop
- Long operating life
- Contributes to reduced final filter pressure loss and reduced operating costs
- Fits a range of new and retrofit configurations

Power Source: GAS/STEAM COMBUSTION TU

Better filtration for cleaner-burning engines.

Look to Parker for:

1. **Plant level gas & liquid fuel treatment**
2. **Lubrication treatment**
3. **Fuel treatment**
4. **Air intake systems & filters**
5. **Compressed air treatment**
6. **Air intake filtration systems**

Plant level gas & liquid fuel treatment

Innovative gas coalescing/filtration technology treats pipeline gas before being fed to engines. Removes a wide range of harmful solid and liquid contaminants including lubricating oils, low surface tension liquids, and aerosol mists to ensure reliable engine operation.

1

Lubrication treatment

A wide selection of environmentally sound, multi-purpose filters allow highly customized solutions for LFO fine filtration. Plus advanced oil purification systems reduce water, gas and particulate contamination from hydraulic fluids, lube oils and insulating oils to improve system performance.

2

RBINE

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Nitrogen Generation

Leading nitrogen generator and low pressure filter work together to regulate, protect and control the flow of natural gas to the engine, also purging the gas feed line as needed.

5

Compressed air treatment

Clean, pressurized air is critical to engine performance as well as nitrogen generation needed for gas line purging. Yet compressed air is often contaminated with dirt, oil, water and harmful particles. Air dryers and filters remove the contaminants, protecting from corrosion, increased maintenance and downtime.

4

Air intake systems & filters

High efficiency systems to maintain gas turbine inlet combustion air quality, even with high dust concentrations. HEPA grade filtration efficiency promotes improved gas turbine performance and reduced operating and maintenance costs.

3

Fuel treatment

A wide selection of environmentally sound, multi-purpose filters allow highly customized solutions for LFO fine filtration. Plus advanced oil purification systems reduce water, gas and particulate contamination from hydraulic fluids, lube oils and insulating oils to improve system performance.

DIESEL ENGINE POWER PLANT

No matter how your reciprocating engine power plant operates – stationary or floating baseload – Parker has the filtration you need to keep it running at optimum efficiency. We offer systems, subsystems, and components that work throughout the plant to reduce emissions, lower maintenance costs, preserve plant and component life, and improve turbine efficiency. From plant level fuel filtration to nitrogen generation and oil purification, you can turn to Parker for solutions that will meet and exceed both your specification, and your expectations.

Fluid Condition Sensor

Parker Fluid Condition Sensor to monitor fuel dilution, soot ingress and contamination on engine lubricating oil.

Low quality, incorrect fuel or oil lubrication combined with infrequent maintenance is a cause of machinery damage, leading to expensive repairs. The Parker Kittiwake Fluid Condition Sensor (FCS) provides constant, real-time monitoring of critical oil parameters - permittivity (dielectric), conductivity, temperature, moisture content and pressure. It determines when oil needs to be serviced due to degradation of the oil chemistry or contamination by other fluids such as water or the wrong oil. When used as part of a pro-active maintenance programme, the FCS will help reduce the overall operating cost of machinery, with associated reductions in failure-related downtime, removal of routine checks and lab testing.

Electrical properties of oil change at different temperatures, which may also vary with oil type and age. FCS features an innovative temperature compensation function to combat these effects, which in turn improves the trend accuracy of data. FCS can measure any combination of the five parameters - oil quality (permittivity, conductivity) moisture, temperature and pressure - as required by the host machinery.

PECOfacet PEACH® Gemini PuraSep®

An innovative concept in gas coalescing technology, the PEACH Gemini PuraSep provides the solids loading capabilities of a filter-separator with the liquid removal efficiency of a vertical coalescer. It can effectively handle higher inlet solid and liquid loads versus conventional coalescing equipment and is designed to remove a wide range of liquid contaminants such as lubricating oils, low surface tension liquids and aerosol mists.

Two stages of coalescing and separation are contained in a single, easily replaceable PEACH Gemini cartridge. This eliminates a conventional 2nd stage mist extraction device, such as a vane or cyclotube, removing concerns of plugging or corrosion.

- 0.3 Micron High Efficiency Coalescing; Provides 28 times more liquid capacity and 7 times greater solids capacity than a vertical coalescer.
- Horizontal Configuration; Provides easy ground access to auxiliary controls and cartridges without the need for ladders and platforms.
- 100% turndown; PEACH Gemini PuraSep can be operated from 0% to 100% of its rated capacity without any effect on performance.

Power Source: Diesel Engine

Filtration systems, subsystems, and components that improve plant efficiency

Look to Parker for:

1. **Plant level fuel treatment / delivery filtration**
2. **Auxiliary module filtration**
3. **Air intake filtration**
4. **Pressurized air treatment**
5. **Oil purification**
6. **Gas filtration**
7. **Dual fuel filters**
8. **Engine crankcase filters**
9. **Condition monitoring**
10. **Oil sampling**

Plant level LFO fuel treatment / delivery filtration

As determined by online analyzers, fuel delivered to power plants can be highly contaminated by abrasive particulates and moisture. Using high efficiency filters to remove these harmful impurities before pumping fuel into the storage tanks – and later before point of use - will ensure smooth engine operation.

1

Auxiliary module filtration

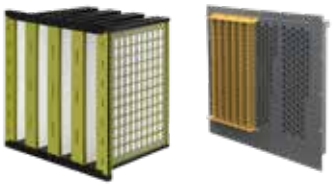
In many cases, fuel, lubricating oil and cooling water components are combined in a single auxiliary module where liquids and gases are pressurized, filtered and heated/ cooled to correct temperatures. By locating the module equipped with lubricating oil filters like DF2070 in front of the engine, impurities coming from external piping can be avoided.

2

Air intake filtration

High efficiency systems to maintain inlet air quality, even with high dust concentrations. HEPA grade filtration efficiency promotes improved engine performance and reduced operating and maintenance costs.

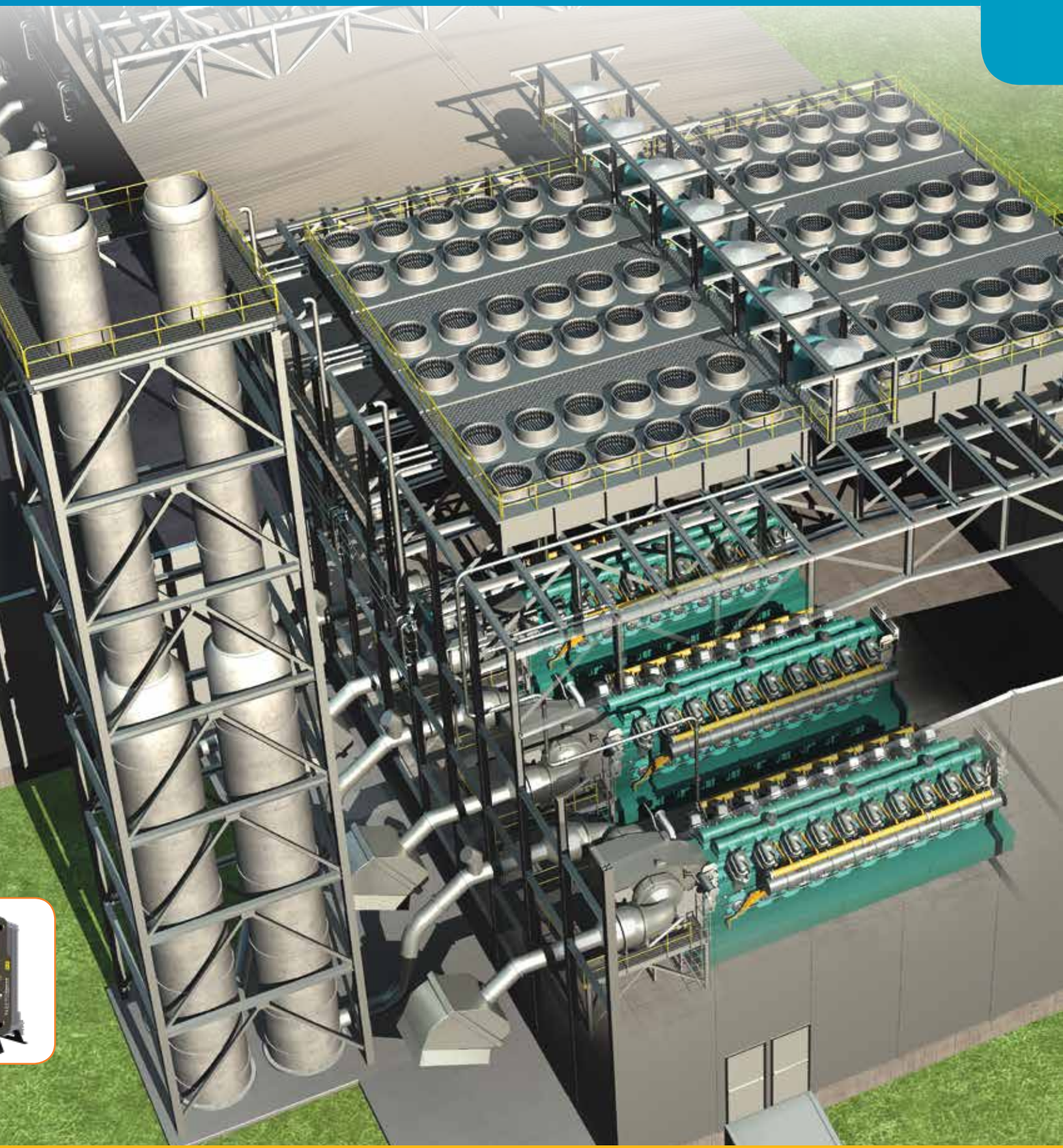
3



Pressurized air treatment

Clean, pressurized air is critical to engine control and reliable starting as well as for generating the nitrogen as inert gas needed for gas line purging on gas applications. Yet compressed air is often contaminated with dirt, oil, water and harmful particles. Air dryers and filters remove the contaminants, protecting from corrosion, increased maintenance and downtime.

4



Oil sampling

Regular oil sampling is needed to maintain the quality and functionality of lubricating oils. Our test kits notify operators of oil water content, total base number, viscosity, insoluble content, total irons and more. These on-site tests speed up necessary corrective actions.

Condition monitoring

Sensors are key to predictive and preventive maintenance for today's engines. Temperature, pressure and oil condition sensors are creating a real-time picture of engine operations. Also, engine metal wear sensors are notifying operators of abnormal component wear.

Engine crankcase filters

Ventilation in the crankcase is needed to offset rising pressure. To prevent the ingress of harmful hydrocarbon particles, this ventilation air must be filtered. In some cases, ventilation air is then fed back to air intake. Coalescing technology is used to filter out oil particles and feed the separated oil back to the oil tank.

Oil purification

A wide selection of environmentally sound, multi-purpose filters allow highly customized solutions for lubricating oil purification. Advanced oil purification systems reduce water, gas and particulate contamination from hydraulic fluids, lube oils and insulating oils to improve system performance.

Gas filtration

Parker Gemini using unique PEACH filtration media is the right choice for removing moisture and particles from pipeline gas. Particulate filters like Parker SF1040 before each Gas Valve Units will ensure proper gas regulating for each engine. Sensitive gas admission valves are protected with safety filters specially designed for each customer.

Dual fuel filters

Pilot fuel filters for dual fuel applications filter the small amount of fuel needed to ignite the gaseous fuels. These filters are normally engine mounted. Additionally, some main fuel oil fine filters are engine mounted, especially with smaller sized engines.

WIND TURBINE

Parker has been on the forefront of wind power for over two decades, with solutions that touch virtually every critical filtration function in the turbine. From filtration for air intake and integrated lube oil systems to online condition monitoring, Parker has the solutions that make today's advanced and sophisticated wind power plants better and smarter.

GLF Series

The Parker GLF low pressure return line filter is engineered to deliver efficient contamination control and performance in today's demanding hydraulic circuits. The Parker GLF is designed to maximize capacity and element life while maintaining low pressure drop, even in cold start conditions. The versatile two port design provides the user installation flexibility and reduces installed cost. The inside-to-outside flow path confines contaminant during element service and minimizes contaminant exposure to the reservoir. The GLF offers pressure gauge and pressure switch ports for visual or electrical switch monitoring of the installed element.

icountPD Online Particle Detector

Particle detection is accepted as the best way to determine whether or not system oil is contaminated and the best way to detect particles on line or off line. Parker's Icount PD allows system monitoring and accurate particle detection from any available source. The system is capable of data transmission in multiple forms and central control can easily collect and manage information. The design dynamics, attention to detail, and small size of the permanently mounted, in-line particle detector brings a truly innovative product to all industry. The laser based, leading edge technology is a cost effective market solution to fluid management and contamination control.

- Parker's laser technology and all the necessary components for reliable monitoring of fluids with up to 1000 cSt oil viscosity.
- Continuous monitoring for dependable analysis
- Cost effective solution in prolonging fluid life and reducing machine downtime
- Early warning LED or digital display indicators.
- Independent monitoring of system contamination trends.

Power Source: Wind Turbine

Higher efficiency. Lower overall system cost.

Look to Parker for:

1. **Gearbox lubricating filtration**
2. **Gearbox desiccant breather**
3. **Hydraulic filtration**
4. **Filter Cart**
5. **Gearbox online condition monitoring**
6. **ParFit interchangeable filter elements**

Gearbox lubrication oil filtration

Our engineered filtration solutions are optimized for long life in wind turbines of all sizes. Leading dirt-holding capacity, lowest pressure drops and high beta ratings of elements ensure clean lube oil supply to the gearbox while minimizing replacement intervals.

Gearbox desiccant breather

Breathers absorb water and particulate contaminants before they enter the equipment, thereby extending the life cycle of gearbox fluids. Our breathers are engineered to withstand high vibration and harsh environments, making them idea for wind turbine gearboxes.

Hydraulic filtration

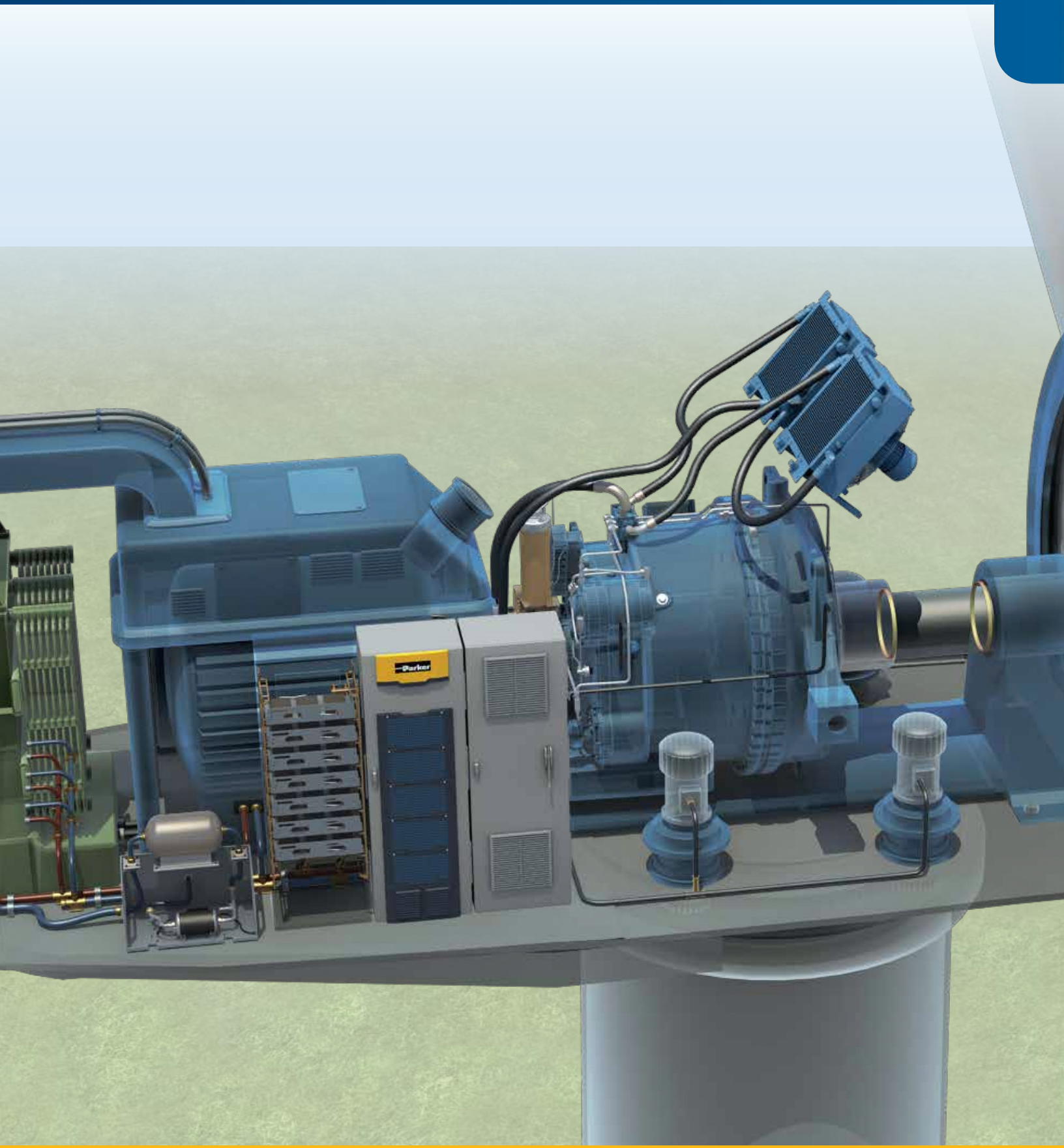
A. Parker's GLF series return line filter is a key component to meet and maintain hydraulic fluid cleanliness in wind turbine OEMs' determined levels.

B. The oil reservoir breather must be secured with proper air filters. Specifically in offshore installations where efficient moisture removal with desiccant breathers is the key to keep harmful water out of oil. Parker's EAB air filter is the ideal solution to block this most common source of contaminant into the hydraulic oil.

C. Parker's EPF / WPF high-pressure filters are prime in protecting sensitive proportional and on/off-directional valves in pitch and brake control systems; ensuring reliable functions also during emergency situations.

D. Bypass filtration is an effective method to polish the hydraulic fluids. Parker's GMF medium pressure series filters are the right choice to remove impurities like particles and free water.

E. Condition monitoring of hydraulic oil is crucial to ensure the designed operation of pitch, yaw and brake systems. Reliable particle detection combined with relative humidity measurements can be achieved with Parker icountOS (off-line) or with Parker icountPD (on-line) equipment.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ParFit interchangeable filter elements

To upgrade existing filters on turbines, Parker offers a wide selection of ParFit elements. These interchangeable hydraulic and lubricating oil filter elements are designed and manufactured with same quality standards as original Parker filters. A cross-reference chart is available for over 50,000 parts.

5

Gearbox online condition monitoring

These leading edge technologies in solid particle detection are important for fluid management and contamination control in the gearbox. Parker MWDS and icountPDR provide reliable debris count for both ferrous and non-ferrous metals within the lubricant, giving you real-time warning of changing wear patterns.

4

New, Parker Wind Cart

Quite often, new oil is contaminated. Transferring the new oil from drums or storage tanks to the system reservoir should always include filtration. Parker's new portable wind cart is the ideal solution to remove particles and water during the transfer and filling process. The wind cart is available with icountPD particle detector to allow accurate detection of impurities when transferring the oil. The unit can also be used offline to polish the oil.

Parker Hannifin Corporation
Parker Energy
6035 Parkland Blvd.
Cleveland, OH 44124
phone 844-E-Parker
www.parker.com/energy