

UFI HYDRAULIC SOLUTIONS FOR WIND POWER GENERATION



A WINNING COMPANY



THE HYDRAULIC DIVISION



A SUCCESS STORY SINCE 1971

Universal Filter Italiana, now UFI Filters, was founded in Nogarole Rocca, in Italy, in 1971 as a supplier of filtration systems for the automotive market.

Some 10 years later, the company began working with the most important Formula 1 teams, becoming supplier of specific, tailor-made solutions guaranteeing top performance and taking the teams to the top of the championships.

In the 1990s, thanks to the vision and growth goals of its owners, UFI Filters began to expand its boundaries into new product development and new world markets.

In 1992, UFI Hydraulic Division was established, starting production of filtration solutions for hydraulic applications in Bolgare, in the North of Italy.

At the start of the new millennium, UFI Filters became the supplier to the most demanding German car and transmission manufacturers, providing fuel filters, oil and air modules and hydraulic filters, thus reinforcing its reputation as a global Original Equipment supplier to the world's leading car manufacturers.

In 2010, UFI entered the world of heat exchangers, specializing in the design, development and production of vacuum-brazed aluminium water-cooled heat exchangers.

Today, 6 of the 7 biggest automotive groups in the world work with UFI to develop complete filtration and lubrication systems.

The results obtained by the company can be attributed to the constant investment in research and

development (over 5% of turnover), allowing UFI to come up with innovative, exclusive solutions for its customers. Over the years, UFI has registered more than 250 patents.

The UFI Innovation Centers in Italy, India and China are equipped with sophisticated, advanced research and analysis tools for developing new products and filtration materials, both for automotive and hydraulic sectors.

UFI Filters now has over 4000 employees at 21 production sites, 3 innovation centers and 57 commercial offices.

Thanks to its Innovation centers and its wide experience, UFI Filters has developed different types of high performing media with specific Formulas, being the first in the market to introduce the synthetic fibres in fuel filters.

UFI filters meets also the requirements of maximum protection for hydraulic systems, with high efficiency and constant stability, thanks to high performance materials and filtration media, according to the market and technology demand.

UFI Filters knows the basis of filtration and masters the best filtering materials to make it work at best.

The company counts now six types of FormulaUFI:
FormulaUFI.Extreme
FormulaUFI.Stratiflex
FormulaUFI.Micron
FormulaUFI.Web
FormulaUFI.H20
FormulaUFI.Cell

ENGINEERED FILTRATION SOLUTIONS

UFI Hydraulic Division is the branch of the UFI Group dedicated to hydraulic filtration, specialized in the design, manufacture and marketing of a comprehensive line of reliable, high efficiency hydraulic filters for mobile and industrial applications.

UFI Filters Hydraulic Division's mission is to create innovative and sustainable solutions in filtration for mobile and stationary applications. UFI Filters puts customers first and aims to provide them with exceptional quality products to enhance the efficiency of their hydraulic systems.

MOBILE HYDRAULIC APPLICATIONS

The supply of reliable hydraulic power to vehicles serving the arduous requirements of the construction industry safeguards vehicle utilization and productivity levels and avoids the expensive, time-consuming issues associated with un-planned downtime, maintenance and repair.

UFI Hydraulic Division has the knowledge and engineering technology to confront and master these issues with a proven range of filtration products for the mobile customer. Many well-known construction vehicle manufacturers and end users have placed their trust in UFI's ability for many years, both in Original Equipment and in Aftermarket.

STATIONARY HYDRAULIC APPLICATIONS

UFI Hydraulic Division has earned a solid reputation for quality and cost-efficient products also for CNC machines, presses, wind power applications and industrial hydraulic systems.

High-performance micro-fibre filtration media, with high voids-volume, warrant validated levels of dirt-holding capacity, coherent with the economic extended machine-life service-intervals demanded by the market. There is no limit for oil cleanliness and therefore filtration quality should be as efficient as layout, costs and pressure-drop will allow.

THE HYDRAULIC DIVISION BY NUMBERS



1992

Founded in 1992, it's now a world leader in hydraulic technology



7

7 application sectors: from heavy duty, industrial and power generation to special applications



150

3 production plants and over 150 employees in 6 countries worldwide



6

6 lines of filter supplied: suction, return, pressure, off-line, transmissions, air



HYDRAULICS IN WIND TURBINE

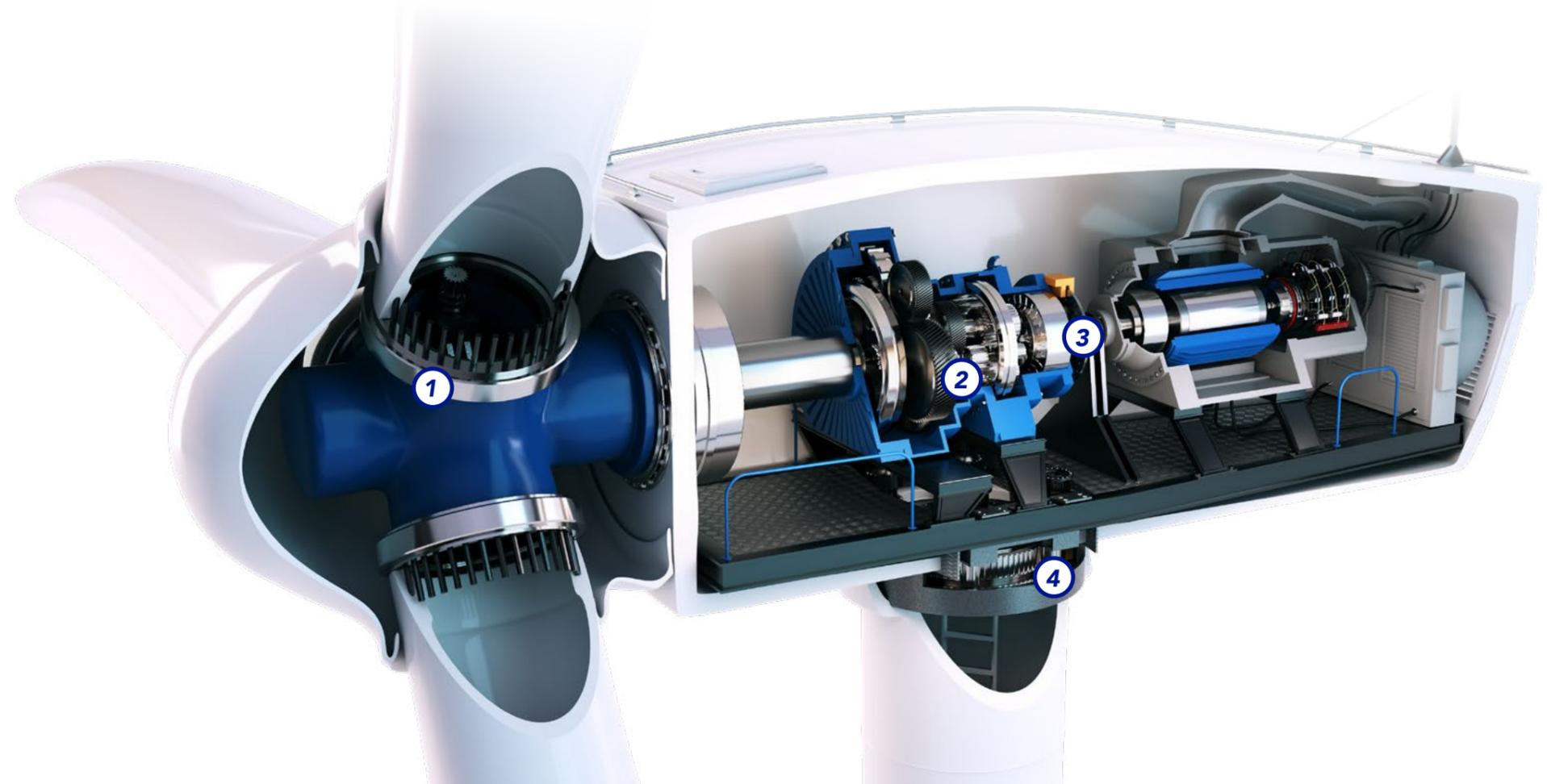
Wind energy is the most efficient technology to produce energy in a safe and environmentally sustainable way. In order to have a secure and sustainable future, wind turbines need to be running economically and require reliable and durable operation.

As hydraulic systems represent a substantial part of each turbine, it is important to implement an effective filtration program, in order to reach the following goals:

- + Prevent the damage of sensitive and usually expensive components
- + Extend maintenance intervals and reduce costs
- + Increase the reliability of pitch control and yaw systems

For this reason, **selecting the best supplier for the most critical hydraulic components is a matter of paramount importance.**

UFI Filters Hydraulic Division has the necessary filtration technology and background to manufacture the hydraulic components to meet OEM, OES and independent aftermarket requirements for wind power generation application.



① HYDRAULIC PITCH CONTROL

Hydraulic pitch systems provide robust and reliable control of power and speed of modern wind turbines. The pitch control serves not only to optimise the power output but also to protect the wind turbine against excessively high wind speeds.

UFI Hydraulics complete filters and spare parts **ensure optimum power output by keeping the pitch hydraulic system clean and efficient.**

② GEARBOX

The gearbox is a critical component in a wind turbine that helps convert rotational energy into electrical power and is one of the most expensive components, accounting for 15% of the wind turbine's total cost. Gearbox failures lead to the most significant downtime experienced as well as the most costly.

UFI Hydraulics complete filters and spare parts **maintain lubrication and filtration systems in good condition, minimise failure rates and reduce costs.**

③ HYDRAULIC BRAKE SYSTEM

The braking system ensures that the wind turbines yaw and main shaft remains reliable and in safe control. Effective braking prevents permanent damage to turbine's structures in high wind speeds, and keeps the service team safe during maintenance. The hydraulic brake system is based on a hydraulic system that allows controlled revolutions in all weather conditions. UFI Hydraulics range includes **flexible and reliable solutions to protect wind turbines braking system.**

④ AZIMUTH DRIVE

The azimuth drive orients the nacelle towards the wind to ensure optimum turbine utilisation. Wind turbines must be aligned optimally to the wind in order to prevent extreme loads and allow a cost-effective operation.

UFI Hydraulics complete filters and spare parts **ensure that the wind turbines yaw and main shaft remains reliable and in safe control.**



HYDRAULIC FILTRATION SOLUTIONS

RELIABLE PRODUCTS FOR THE MOST DEMANDING OPERATING ENVIRONMENT

UFI Filters Hydraulic Division, thanks to more than 25 years of experience in hydraulic filtration, guarantees the necessary filtration technology and background to manufacture **complete filters, spare parts and accessories specifically designed for the Wind Power Generation sector**, in order to meet the most demanding OE, OES and independent aftermarket requirements.

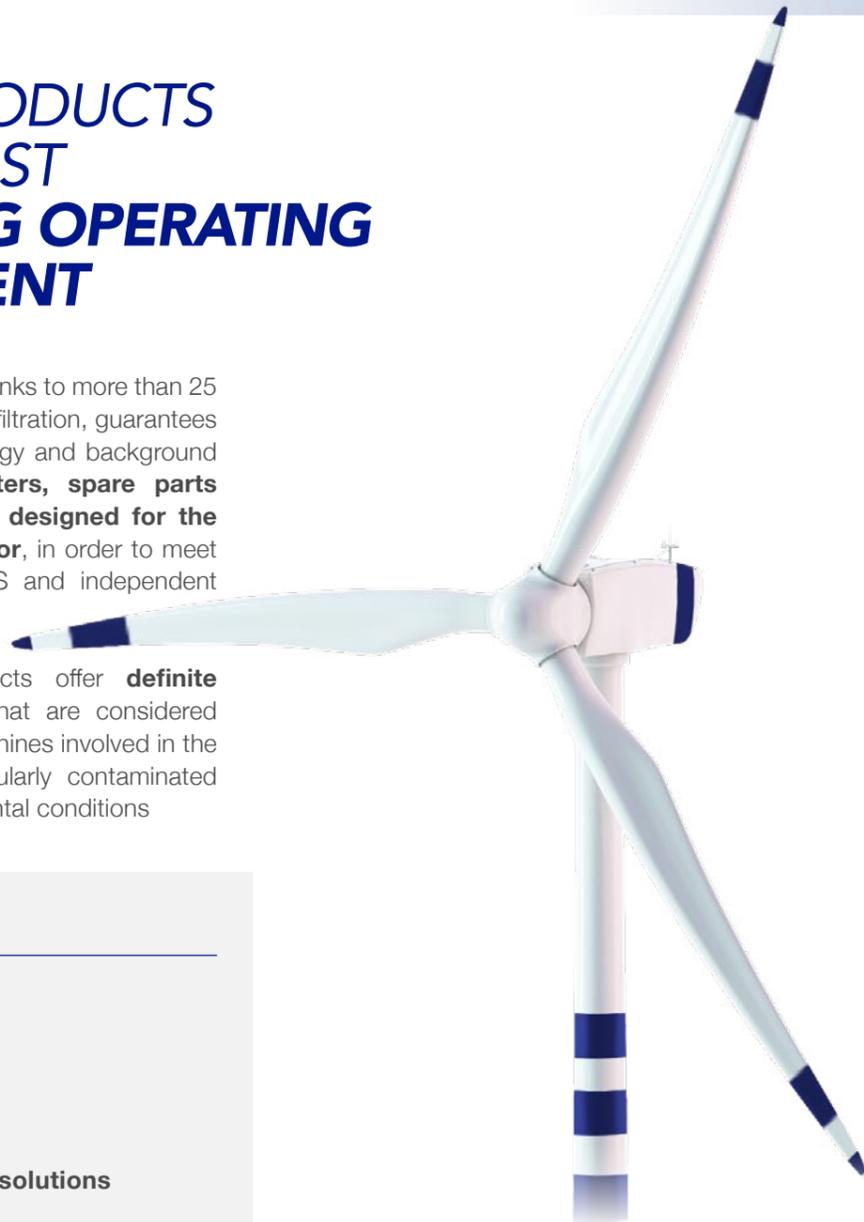
UFI Hydraulic Division products offer **definite and reliable performance**, that are considered strategic features when the machines involved in the maintenance operate in particularly contaminated contexts and difficult environmental conditions

PLUS

- + High degree of filtration
- + Extended filter life
- + Longer service interval
- + High reliability
- + Wide range of **tailor-made solutions**

UFI Hydraulics components are designed to be **compact, lightweight** and **easily serviced**, yet providing at the same time **exceptional service life** to work properly in the most demanding of operating environments.

UFI Filters Hydraulics offers well-engineered solutions to protect wind turbines by helping to avoid malfunctions and the fallout of control devices. UFI's hydraulic products **improve the productivity and the reliability of renewable energy sources**, for on-shore and off-shore wind turbines, by ensuring permanent and failure-free operations.



HIGH PRESSURE FILTER MANIFOLD MOUNTING

The high pressure FPL series offers a wide range of possible combinations, housing dimension and lengths, together with several filtration degree options, thus ensuring:

- **specific ideal configuration** for each wind turbine
- **optimal assembly cost**
- **reduced overall dimensions**, as well as piping and adaptor fittings required to protect sensitive components, thanks to direct side mounting on manifolds



FPL

RETURN LINE FILTER TANK TOP MOUNTING

Return Line filters remove the contaminants from the oil used for lubrication, for this reason FRA and FRF series are key elements for the filtration of wind turbines:

- **compact and lightweight layout**
- **inside to outside filtration** for FRF series
- **smooth and cost effective operation**



FRA



FRF



HIGH EFFICIENCY FILTRATION



OFFLINE FILTER

UFI Hydraulic Offline FOF Series allows for independently controlled offline filtration of the hydraulic oil 24/7, thus safeguarding:

- improved lifetime on all components
- improved lifetime of hydraulic oil
- efficient continuous offline filtration of the hydraulic oil and **increased earnings**



FOF

WATER REMOVAL FILTER ELEMENTS

Used in combination with the other hydraulic filters, Hydro Dry water removal filter elements provide significant benefits:

- less component wear
- reduced downtime
- improved machine productivity
- less replacement and disposal of contaminant fluid
- reduced risk of failure

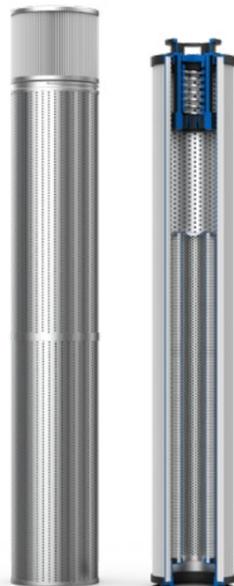


HYDRO DRY

DOUBLE AND TRIPLE STAGE FILTER ELEMENTS

Double and Triple stage filter elements are specifically designed for wind turbine application and are used to filter lubricants even under cold start conditions. UFI Hydraulics 2-Stage elements consist of two separate filter elements designed in series in order to secure a filtration even if the bypass opened under low temperature conditions and thus guides the oil through the element and over the security filter. These special elements guarantee:

- a certain level of **filtration even under the hardest conditions**
- **low initial differential pressure,**
- **high dirt holding capacity** and filtration performance due to multi-layer glass fiber technology



DOUBLE AND TRIPLE STAGE

HIGH PRESSURE SPIN-ON

UFI Fortimax high pressure spin-on elements are designed to fit in many different type of housing and are ideal for the most demanding wind power applications as they allow:

- **initial lower clean pressure drop**
- **superior system protection**
- **extended filter life** resulting in **longer change intervals**



FORTIMAX



OPTIMAL WIND TURBINE PROTECTION

ECOFRIENDLY FILTER SERIES

UFI hydraulics developed a specific series to meet also the most demanding requirements to respect the environment and reduce polluting components in the hydraulic system. GRF series presents:

- **coreless filter elements**, that combine environment compatibility with UFI certified quality
- **lightweight layout**
- **easy service**



GRF

IRF

AIR BREATHERS

UFI Hydraulic air breathers are placed on hydraulic reservoirs and gearboxes to prevent atmospheric contamination from entering and ensure:

- **optimal air movement** inside the reservoirs
- **pressure equalization** inside the chamber



CBS

CSE

CBC

HYDRAULIC OEM ALTERNATIVE FILTER ELEMENTS

UFI Filters Hydraulics manufactures a wide range of lube oil filter elements, designed to upgrade any filtration system thanks to FORMULA.UFI media, the industry-leading media optimized for long life in wind turbines of all sizes. UFI Hydraulics alternative elements ensure:

- **high dirt-holding capacity**
- **low pressure drops and high beta ratio**
- **clean lube oil supply to the gearbox in order to minimise replacement intervals**



DESSICANT BREATHERS

Wind turbine Desiccant breathers are a key component designed to protect lubricant quality, widely used in gearboxes, storage tanks, transformers and hydraulic stations. UFI Hydraulics Air Sentry desiccant breathers not only filter solid contaminants from the air entering sensitive equipment, but also remove moisture from the entering air to keep the oil clean and dry.

Main advantages:

- **3-stage filtration design** to ensure optimum protection
- **clean and dry air** in the system
- **water absorption** up to 40% of its weight



AIR SENTRY



The proper maintenance of the hydraulic systems and the accurate cleanliness of the hydraulic system are key factors in achieving the best performance of a wind turbine while bringing down the maintenance and running costs.

All UFI Hydraulics elements are made with FORMULA.UFI media, in order to provide high levels of fluid cleanliness while maintaining low pressure drop characteristics.



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