

HIGH PERFORMANCE LUBRICANTS THAT INCREASE UPTIME AND PROLONG THE LIFE OF WIND TURBINES



IT'S MORE THAN JUST OIL. IT'S LIQUID ENGINEERING.



CASTROL'S LIQUID ENGINEERS HELP MEET THE CHALLENGES OF THE WIND ENERGY INDUSTRY

LUBRICANT TECHNOLOGY PLAYS A VITAL ROLE IN KEEPING TODAY'S WIND TURBINES RUNNING RELIABLY AND EFFICIENTLY.

Castrol has more than 30 years' experience of supporting the wind energy industry with world-class lubricants and product support services. We supply lubricants to thousands of wind turbines. Our parent company, BP, is one of the largest wind park owners in the U.S. with a gross generating capacity of around 2,600 MW – enough electricity to power over 775,000 average American homes. From this platform we can evaluate the effectiveness of our products and services which are geared towards meeting the demands of modern technology.

Based on our own experience, and from working closely with Operations and Maintenance managers, we understand the importance of increasing the efficiency of assets, maximising uptime and reducing downtime. Given the extreme challenges that wind turbines face, the right lubrication choices can help extend wind turbine uptime and keep equipment performing effectively throughout its life.

UNIQUE CHALLENGES OF THE WIND TURBINE AFTERMARKET

ENVIRONMENTAL CHALLENGES

- Lubrication points are subject to dirt, dust, water, high turbulence and extreme temperatures
- They can be hundreds of feet in the air
- Access to offshore installations can be hindered by a logistical factors, including high seas

OPERATIONAL CHALLENGES

- Turbines need to run intermittently and at varying speeds
- They are subject to a very wide range of temperatures – from -40°C to >50°C
- High levels of vibration put pressure on moving parts

COMMERCIAL CHALLENGES

- Pricing competition from conventional energy sources
- Balancing income from equipment with prolonging its service life
- Greater output demand increases the loading on bearings, drives and gear boxes



OUR SOLUTIONS SUPPORTED BY INNOVATION AND APPROVED BY OEMS

Formulated to help address the challenges of the wind energy industry, our high performance gear oils, bearing lubricants, hydraulic fluids and greases are supported by services to monitor lubricant quality and performance.

From our work with OEMs, wind energy farm owners, turbine operators and service providers, we understand the need for products that deliver advantages in the field – not just in the lab. The wide range of OEM approvals gives wind farm owners and operators assurance of their suitability for any fleet¹.

PROVEN PERFORMANCE

Castrol's solutions incorporate innovative lubricant technology to provide a high level of performance and protection. As well as using our own specialised testing facilities to test our products' effectiveness under different operating conditions, we submit our technologies to rigorous independent comparison with competitor products.

In our laboratory tests, use of Castrol's gear oils like Optigear Synthetic X and Optigear Synthetic CT has shown the following advantages among others when compared to other leading gear oils on the market:

- Significantly less micropitting
- Lower weight loss on rollers (up to 50%)
- A lower friction coefficient

These qualities help prevent problems caused by reduced gear tooth accuracy, fatigue and failure associated with micropitting and friction. As a result, using Castrol's gear oils help maximise an asset's return on investment by improving the reliability of gearboxes, consuming less power and protecting components from damage. All of which helps lower the cost of maintenance and repairs.

PRODUCTS AND EXPERTISE YOU CAN TRUST

Castrol's global reach gives you access to our network of sales, engineering, research and manufacturing capabilities, wherever you operate. Our global sales and distributor network has an extensive knowledge of Castrol products and is on hand to support your wind farm operations and maintenance needs. A network of specialist service companies can also support you during oil change procedures with Castrol products, in line with the requirements of the wind turbine OEMs.

¹Please refer to the Castrol Global website link or consult your Castrol representative who can share the various global OEM approvals and endorsements

KEY LUBRICATION POINTS OF A WIND TURBINE



1. MAIN BEARING

Castrol Spheerol LC 2
Castrol Optigear Synthetic X 320
Castrol Optitemp SW1

2. PITCH ADJUSTMENT

Castrol Optitemp SW1
Castrol Spheerol LC 2

3. YAW BEARING

Castrol Tribol 1350 – 2.5 PD
Castrol Optitemp SW1

4. HYDRAULIC SYSTEMS

Castrol Hyspin AWH-M 32
Castrol Hyspin HVI
Castrol Brayco 717

5. MAIN GEAR AND AUXILIARY GEAR DRIVES

Castrol Optigear Synthetic X 320
Castrol Optigear Synthetic CT 320
Castrol Optigear Synthetic A 320
Castrol Optigear MX 320 & MX 460

6. GENERATOR BEARING

Castrol Longtime PD 2

7. YAW OPEN GEAR

Castrol Tribol 1350 – 2.5 PD
Castrol Molub-Alloy 936 SF

CASTROL HIGH PERFORMANCE GEAR OILS ENGINEERED FOR WIND ENERGY GENERATION

Bearings, drives and gearboxes rank as the highest cause of costly downtime, and these are the areas which are subject to increased loading in heavier duty cycles. Gear oils account for almost 80 to 85% of the lubricants used in wind farms, and Castrol has developed two high-performance gear oils to meet the demands on wind turbine gearboxes: Optigear Synthetic X and Optigear Synthetic CT.

CASTROL OPTIGEAR SYNTHETIC X

Castrol's Liquid Engineers have developed this pioneering technology to protect and enhance the performance of wind turbine gearboxes. Based on synthetic hydrocarbons, Optigear Synthetic X contains surface improvement additives which equalize surface roughness without creating damaging abrasion, which may cause gearbox failure. The technology, supported by OEM approvals, helps to prolong equipment life and protect against future damage.

CASTROL OPTIGEAR SYNTHETIC CT

Castrol Optigear Synthetic CT has been formulated to meet major OEM specifications for wind turbine gearboxes. Its combination of an advanced additive system, high performance base fluid and ester-free formulation offers gears maximum protection against corrosion, wear and shock loading. Its excellent thermal and oxidative stability deliver reliable operation especially where changes in temperature are experienced, as well as an extended operating life compared to lubricants based on mineral oil.

GLOBAL RELIABILITY

As a global company, the benefits of Castrol's products, services, technical teams and distributor support are available wherever your wind farms need them.

Our commitment to supporting wind energy company's efficiency program extends to the investment we have made in both production processes proven by automatic in-line particle counters in the filling line and packaging to help ensure that cleanliness standards are maintained throughout supply and delivery.

USED OIL ANALYSIS FOR PROACTIVE MONITORING

Any wind turbine equipment failure impacts production, availability and overall cost efficiency. A joint working pro-active maintenance regime from Castrol can help you reduce gearbox failures by giving you insight into the performance of your wind turbine equipment.

BENEFITS FOR YOU

- Comprehensive joint monitoring plans help increase machinery availability and reliability
- Testing to monitor oil and machine condition improves oil change frequency
- Regular analysis helps identify trends which may indicate potential future problems
- Results can be trended and represented graphically for easier reference
- Trending specific parameters gives a good overview of system and/or machine performance
- Technical recommendations can be made when analysis results are outside agreed limits
- Helps improve equipment maintenance plans
- Helps avoid unnecessary system changeovers and machinery failures
- Reporting information (current and historic) enables performance tracking and monitoring

Please contact your Castrol representative for more information about the value that Castrol Used Oil Analysis can deliver.

THE CASTROL OFFER

Our post warranty offer for customers will help to reduce downtime, increase overall efficiency and maximise your return on asset investment through a combination of our Products & Services offer:

GLOBAL PRODUCTS AND OEM APPROVALS

Wide range of OEM approvals and endorsements* for our products

USED OIL ANALYSIS PROGRAMS

Used Oil Analysis Program (UOA) to help build data transparency

FLUSHING PROCEDURE GUIDANCE AND SUPPORT

Easy switch of gear oils with flushing guidance

FILTER ANALYSIS SERVICE

Filter analysis service to analyse, understand wear particles and ensure proactive maintenance for the specific gearbox components to help reduce downtime

GLOBAL LOGISTICS SUPPORT

Global reach and logistics support

EXPERT KNOWLEDGE

High quality pre filtered products from our manufacturing plants*

CAPABILITY BUILDING PROGRAMS

Support through conducting joint programs which will further strengthen existing teams' capabilities through our Global O&M best practice sharing.

*Please speak to your Castrol representative who can share the updates with you.





Further information about Castrol's range of products and services is available on the Castrol website and the Lubricant Oracle.

Visit www.castrol.com/windenergy

Castrol
Technology Centre
Whitchurch Hill
Pangbourne
Reading
RG8 7QR

www.castrol.com/windenergy

The information and recommendations contained herein are based upon laboratory research, experience in the field and/or state-of-the-art procedures, and are believed to be accurate and reliable. However, they are provided as information only and in no way modify, amend, enlarge, or create any specification or warranty, and all warranties, express or implied, including without limitation the warranties of merchantability and fitness for a particular purpose, are excluded. Please contact your Castrol expert for any trials, discussions and all conversions.

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