

V112-3.0 MW

One turbine for one world

vestas.com

Vestas®



No. 1 in Modern Energy

The world needs ever-greater supplies of clean, sustainable energy. Modern energy that promotes sustainable development and greater prosperity for all our planet's inhabitants. Vestas wind turbines are already generating more than 60 million MWh of electricity every year – enough to power all of Spain, for example – and we are ready to go even further. After more than 30 years in business, Vestas continues to pioneer the wind energy business, achieving breakthroughs that transform our entire industry. Our latest breakthrough is the V112-3.0 MW, the next great stride for modern energy.



WE DELIVER
ON THE PROMISE
OF WIND POWER



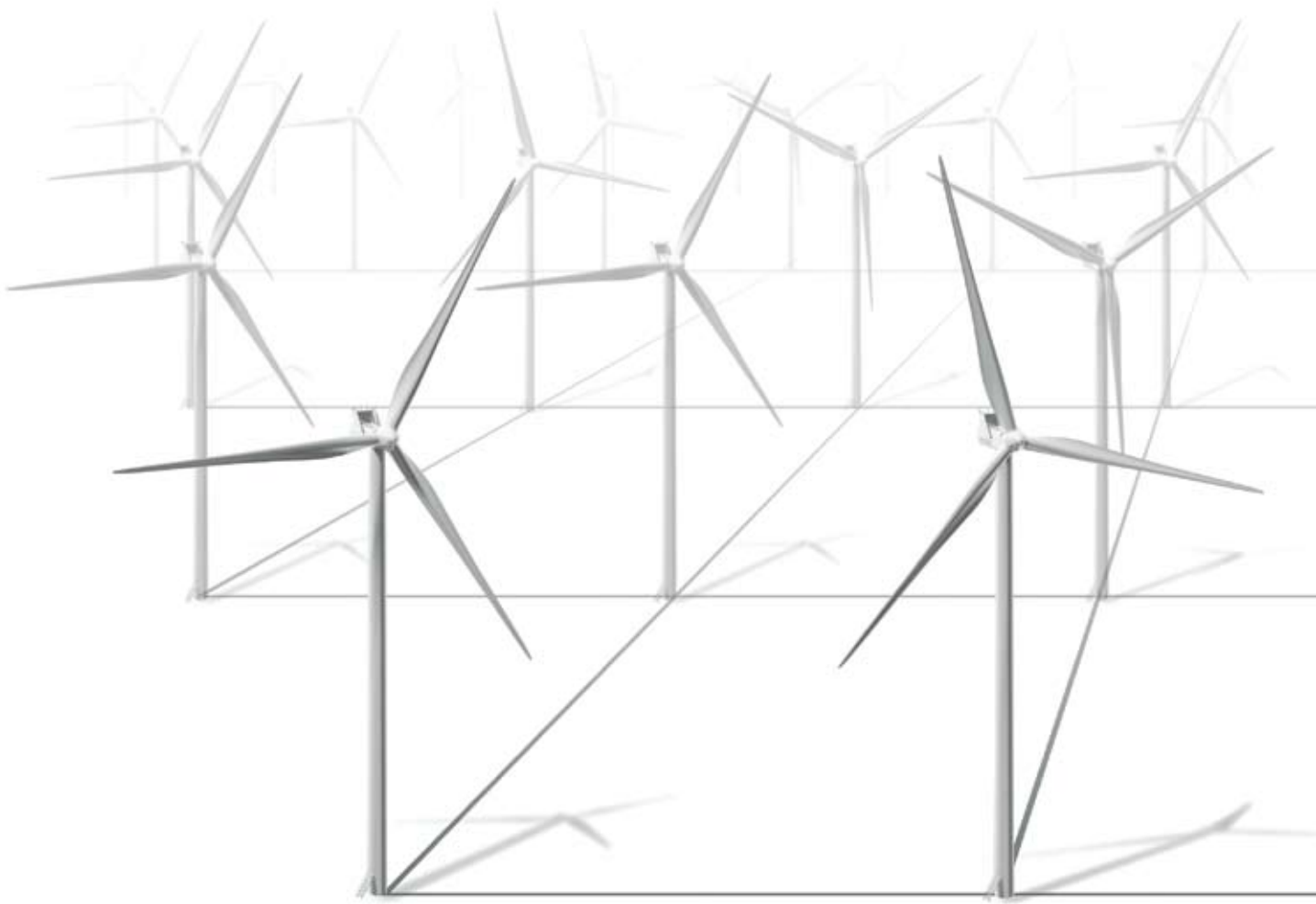


ONE HARD-WORKING, RELIABLE TURBINE FOR ONE WORLD

Hard-working and reliable

The V112-3.0 MW is a hard-working, reliable turbine designed for low and medium wind speed sites onshore anywhere around the world. These are the areas that comprise tomorrow's biggest market for wind power plants. The V112-3.0 MW can

generate more power than other turbines in the 3 MW class. It offers an exceptional rotor-to-generator ratio for greater efficiency and delivers unsurpassed reliability, serviceability and availability under all wind and weather conditions – setting a whole new standard for turbine performance and efficiency.



THE ULTIMATE CHOICE FOR HIGH, STABLE PLANT OUTPUT

Innovative technology with decades of experience

The V112-3.0 MW is built on tried and tested technology that Vestas has improved even further. We call it innovative technology with decades of experience. The V112-3.0 MW comes with significant innovations in areas such as blade design, nacelle design, cooling systems and load-optimized operation.

Finally, the V112-3.0 MW is designed around a large number of standard components that several suppliers can provide. These easily obtainable spare parts and components also help ensure reliability and high availability.

Flexible grid integration and stable output

Vestas products, such as the V112-3.0 MW, are designed so that your wind park will be fully compliant with applicable grid codes at the point of common coupling. How this is achieved may differ from country to country, but generally, the Vestas advanced grid compliance system provides active and reactive power regulation, frequency regulation and fault ride-through capabilities to support grid levels and stability in the event of grid disturbances.



Advanced power electronics conversion

Advanced power electronics conversion ensures stable and scalable output from the turbine. Combined with a flexible operations strategy, advanced power electronics conversion allows you to increase power production by temporarily increasing the power output of the turbine in favorable conditions.

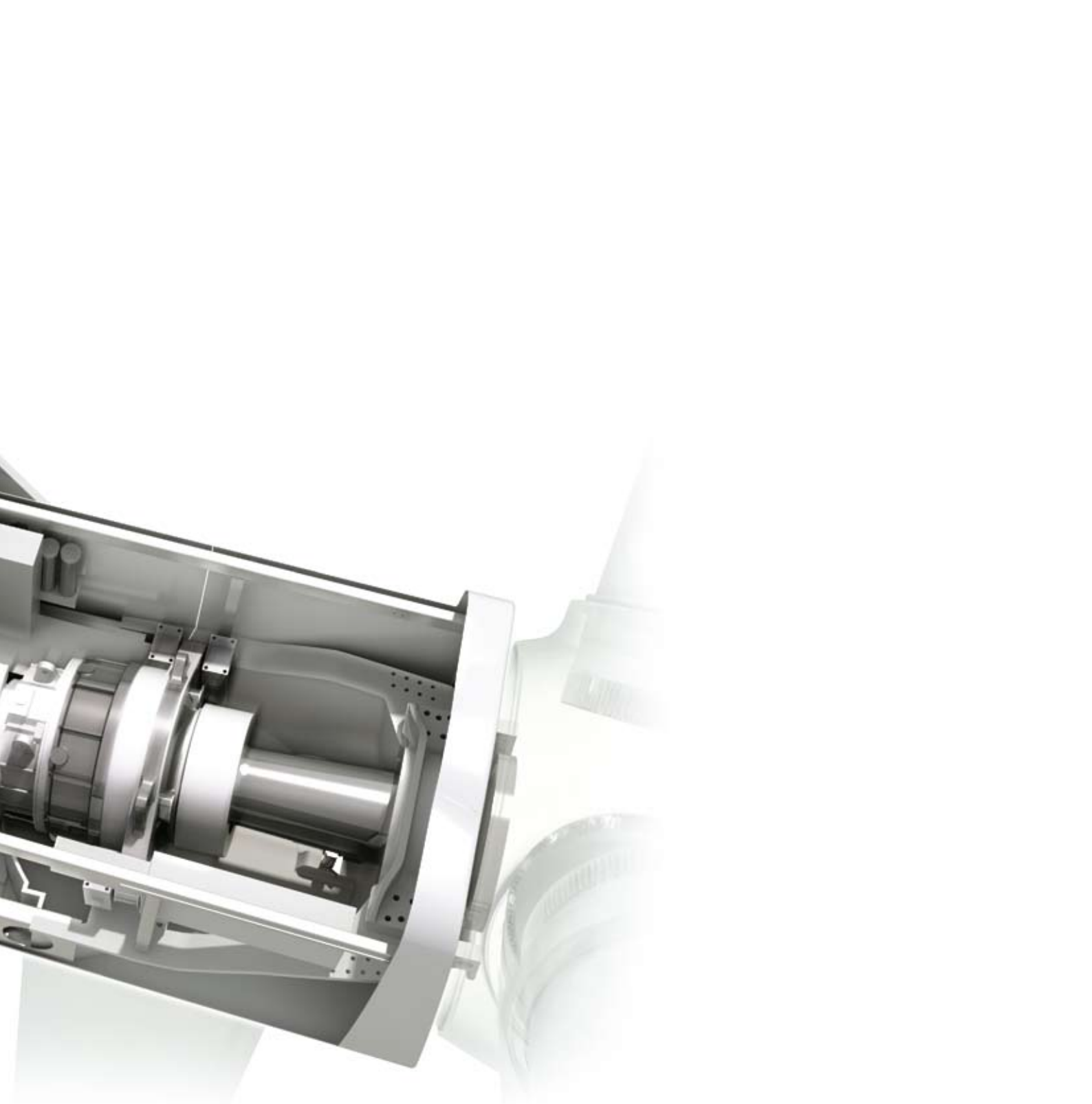


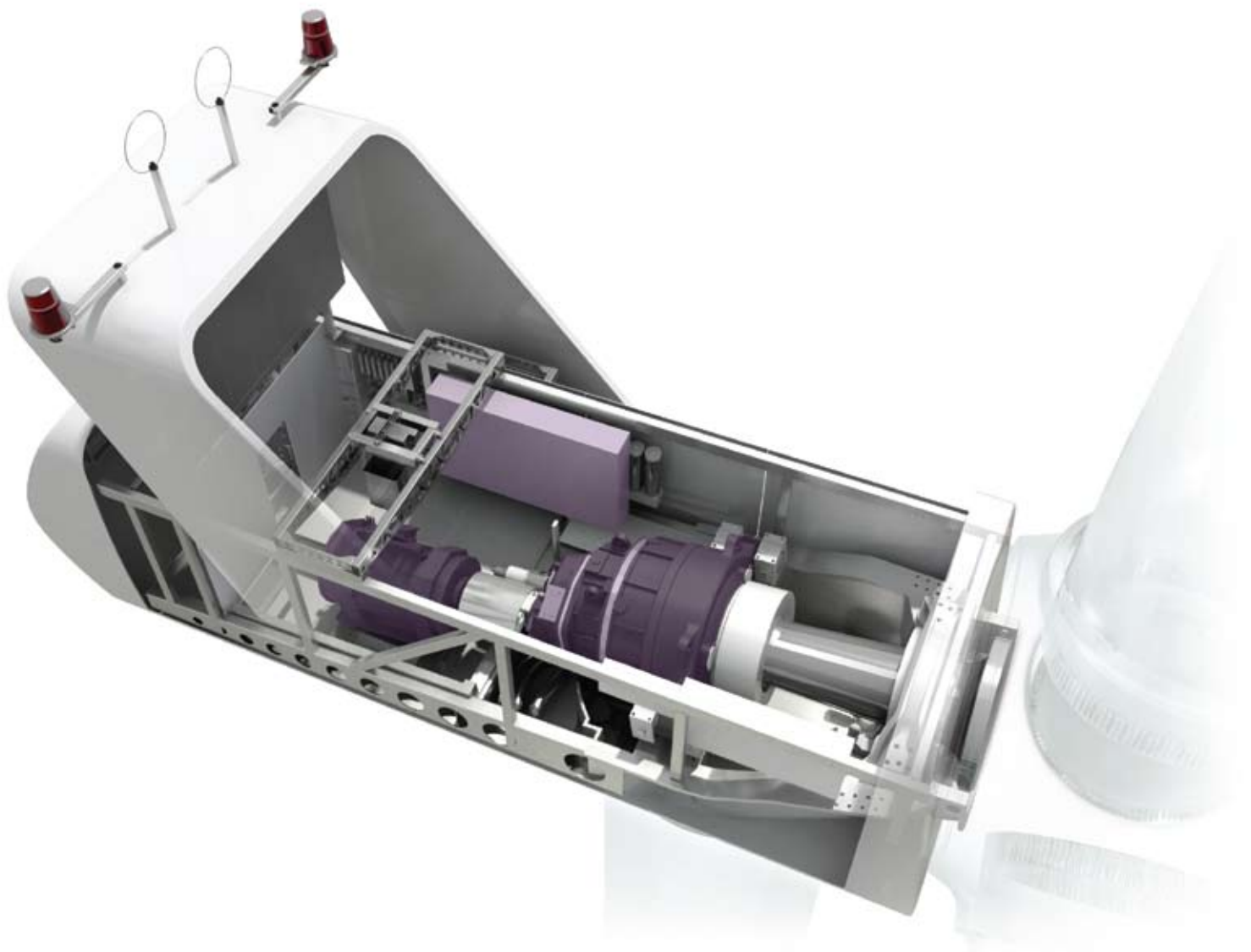
Built for easy maintenance

The new nacelle design is a good example of innovative technology with decades of experience. The power converter is integrated into the nacelle floor, which provides more working space and makes it easier to service the components. Significantly more floor space is just one of the features that make service and maintenance both faster and easier.

The design makes smarter use of space while also setting new standards for ergonomics and safety in the nacelle. Essential tasks can be completed effectively without compromising safety.

There is plenty of room for handling all spare parts, and the main components can be lifted in with ease. On sites with limited accessibility, it can often be a good idea to install nacelle components with the help of Vestas' innovative tower crane, which does away with the need for expensive mobile cranes.



**Load reduced operation**

Load reduced operation provides extra security at complex sites, where narrow sectors with extreme gusts and other abnormal wind conditions can occur. Load reduced operation enables the turbine to automatically protect itself against needless wear, which can damage the turbine and shorten the service life of some components.

Main component preheating

The cooling system in the V112-3.0 MW is also used for preheating, which prevents condensation. Primary components such as the generator, the gearbox, the converter and the blade hydraulic system are heated from inside by means of hot water in the cooling systems when the turbine restarts after a production stop in cold climates.

Automatic lubrication

Automatic lubrication of the blade bearings, the yaw system, the main bearing and the generator boosts reliability while reducing the frequency of service calls.



OPTIONS

The V112-3.0 MW is available with a number of special options that can be provided at the customer's requests. These options include:

- Condition monitoring system
- Aviation markings on the blades
- Aviation lights
- Smoke detectors
- Fire extinguishing system in nacelle
- Company logo
- Low temperature operation to -30°C
- Ice detection system



GROUNDBREAKING DESIGN

CoolerTop™ saves energy and reduces sound levels

The environmentally friendly CoolerTop™ is yet another example of the V112-3.0 MW's state-of-the-art technology. It cools the coolant used in the turbine's cooling system by channeling wind into the radiator. This boosts reliability, not least by reducing the number of moving parts and electrical components in the cooling system. CoolerTop™ reduces the turbine's own energy consumption and keeps sound levels low, making the V112-3.0 MW an exceptionally neighbour-friendly turbine. Finally, CoolerTop™ ensures sufficient cooling even at high altitudes, further enhancing the turbine's suitability for use almost everywhere in the world.

Can be installed almost anywhere in the world

Even though the V112-3.0 MW is a mass-produced wind turbine for low and medium wind speed sites, it complies with all the standard transportation requirements. Even with its 54.6-metre blades, the V112-3.0 MW can be transported to most sites in the world without being subject to special fees and restrictions that can delay or increase the cost of wind power plant construction.





A giant stride in aerodynamics

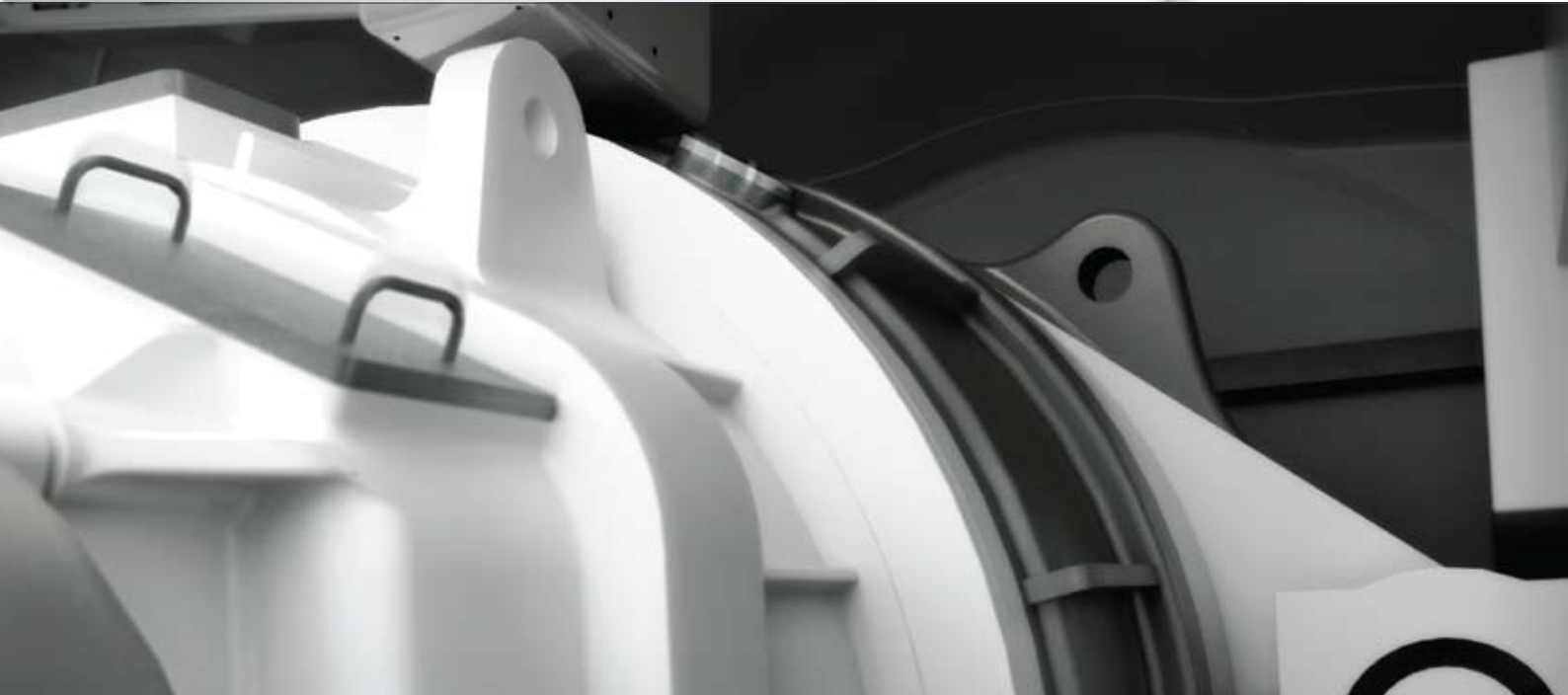
Vestas is famous for designing and producing some of the world's lightest and most effective blades – blades that deliver the greatest possible output while causing the least possible loads to the turbine.

With the groundbreaking 54.6-metre blades on the V112-3.0 MW, Vestas has taken another giant stride in aerodynamics. Although these blades have the same width as our 44-metre blades, they sweep an area that is 55% greater to deliver considerably higher output.

Finally, the blades are designed to be less sensitive to dirt, resulting in better performance at sites affected by salt, insects or other particles in the air.

Low sound levels, high productivity

The V112-3.0 MW is a quiet turbine even during power optimised operation, but it is even quieter during low-noise operation. The turbine can be operated in configurable modes that keep within defined decibel ranges, without having a significant effect on productivity. This makes the V112-3.0 MW ideally suited for use anywhere in the world where sound-level limits are in force.





VESTAS TAKES CARE OF YOUR INVESTMENT ROUND THE CLOCK

Verified component lifetime

At the Vestas Testing Centre and Technology R&D, engineering experts and technicians use state-of-the-art testing methods to ensure that all components and systems meet our standards for safety, performance and reliability throughout their 20-year service life. These tests push the components beyond their specifications. One method is known as Highly Accelerated Life Testing, where some of the testing is conducted in a HALT chamber. Extreme fluctuations in temperatures combined with heavy vibrations are just some of the stress tests the components are subjected to here. This enables Vestas to identify and address design flaws long before the turbines reach the market.

Surveillance 24/7/365

Our surveillance services are manned 24/7 all year round to provide real-time surveillance, remote troubleshooting and other services. These services can also detect potential errors and disruptions before they occur, as data from your turbines is gathered and analysed. This enables us to prepare a plan for preventative maintenance, in an effort to minimise unexpected production stops and costly downtime.

Service and maintenance

Vestas has service centres around the globe and we are able to cover your every need, from simple cleaning and planned maintenance to emergency call-outs and on-site inventories customised for your turbines.



Asset management and operation risk mitigation

Your wind turbines have to be maintained with great care to avoid exposing your investment to unnecessary risks. And that is exactly what Active Output Management is designed to ensure – that you get the greatest possible return on your investment in a Vestas wind turbine.

AOM provides a number of advantages, such as detailed plans for service and maintenance, online monitoring, optimisation and troubleshooting, and a competitive insurance scheme. We even offer a full availability guarantee, where Vestas pays compensation if the turbine fails to meet the agreed availability targets.

Project management for effective plants

The better your turbines fit your wind site, the more profitable your plant will be. That's why Vestas offers to take on project management from the initial wind measurements to complete installation of the wind power plant. More than 30 years of international experience and local expertise enable us to complete:

- Wind and site studies
- Designing the wind power project
- Selecting wind turbine types
- Installing the wind farm
- Servicing and maintenance throughout the turbine's service life
- Monitoring and remote troubleshooting.

TECHNICAL DATA FOR V112-3.0 MW

Power regulation

pitch regulated
with variable speed

Operating data

Rated power	3,000 kW
Cut-in wind speed	3 m/s
Rated wind speed	12 m/s
Cut-out wind speed	25 m/s
Wind Class - IEC	IIA/IIIA
Max. altitude	1,500 m
Operational temperature range	standard range -20°C to 40°C low temperature option -30°C to 40°C

Sound power

7 m/s	100 dB(A)
8 m/s	102.8 dB(A)
10 m/s	106.5 dB(A)
By 95% rated power	106.5 dB(A)

Rotor

Rotor diameter	112 m
Swept area	9,852 m ²

Tower

Type	tubular steel tower
Hub heights	84, 94 and 119 m

Electrical

Frequency	50 Hz/60 Hz
Converter type	full scale converter
Generator type	permanent magnet generator

Main dimensions

Blade

Length	54.6 m
Max. chord	4 m

Nacelle

Height for transport	3.3 m
Height installed	3.9 m
Width	3.9 m
Length	14 m

Tower

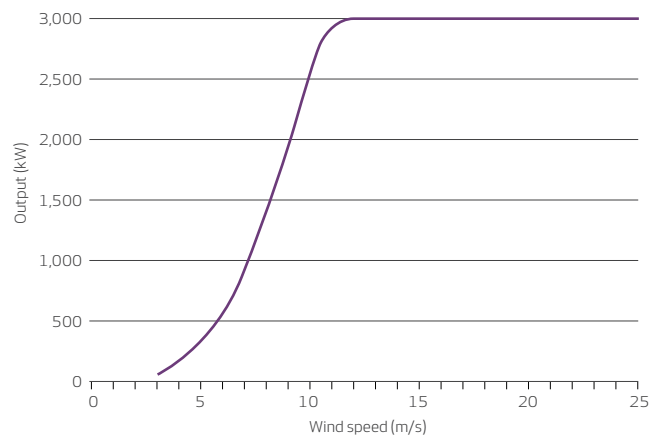
Max. section length	32.5 m
Max. diameter	4.2 m

Hub

Height	3.9 m
Diameter	3.2 m

Max. weight per unit for transportation	70 metric tonnes
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Power curve V112-3.0 MW



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This product will not be available for delivery in the USA before spring 2011 and in Canada before spring 2012.



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