



# Alternative Energy



**ebmpapst**

The engineer's choice

# About ebm-papst Inc.

## Headquarters - Farmington, CT

- » 250K sq. ft.
- » 20 Regional offices
- » Acoustic testing chamber
- » Complete air testing lab on site
- » ISO 9001 and 14001 Certification
- » Distribution centers in Farmington (CT) and Toronto, Canada

## Expert design and manufacturing

Our staff of design, electrical, and application engineers possesses a wealth of knowledge and experience enabling unparalleled guidance and support to our customers and their projects. Cutting-edge equipment and innovative technologies are used to develop customer concepts into sub-assemblies or complete product ranges. Our engineers draw upon the vast resources available throughout the ebm-papst family to ensure that the most innovative and energy-efficient air movement components are correctly applied.

Beginning with the initial product concept, our application engineers work in tandem with customers to select the best air moving solution to suit specific goals and requirements. Once the prototype has been established, it can then be tested in our state-of-the-art airflow testing chambers, allowing for the optimization of all air moving solutions. Each chamber has been designed to meet AMCA210-99 and ISO5801 requirements. In addition to our airflow testing capabilities, ebm-papst can conduct comparative sound, temperature, and velocity tests.

Design and electrical engineers advance the concept into a packaged air moving device incorporating sheet metal, fan controls, handlers, filters, gaskets and more. Our design engineers utilize the latest version of "Pro-Engineer" software to create a viable and cost-effective contract manufacturing solution. File sharing between customers and our team of engineers enables all stages of the prototype design to be verified before the initial build of the product. The electrical engineering team can design simple fan controllers for monitoring fan speed, or complex controllers and power supplies, filtering, and specific communication protocols.

## Logistics and inventory management programs

We have over 90,000 sq. ft. of climate-controlled warehousing at our facilities offering real-time inventory transactions and bar-coded inventory. Inventory management programs such as Kanban, demand/pull, safety stock, consignment, and local warehousing can be customized to your needs.



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## The symbol of our commitment

GreenTech is a name put to the philosophy ebm-papst has used for decades: "each new product that we develop has to be better than its predecessor in terms of economy and ecology." Our company philosophy is not just for designing new and more efficient fans and blowers; it is in practice in the offices and factories, locally and internationally. At the U.S. headquarters, two separate arrays of solar panels have been installed to provide the engineering building with electricity, along with additional renovations that make the facilities even more environmentally friendly.

GreenTech symbolizes our continuous commitment, achievements, and passion to provide customers with high quality products through the use of modern development and production methods, responsible business practices and initiatives that benefit not only the user, but the environment as well.

## What is EC Technology?

EC technology is an important factor in our GreenTech philosophy. ebm-papst EC fans use permanent magnet external rotor DC motors with fully integrated electronic commutation (EC) and AC to DC power conversion. EC motors give the flexibility of connecting to AC mains with the efficiency and simple speed control of a DC motor. With EC fans, the user benefits from the innovative commutation without wear-and-tear on the motor. The EC motor compares to the direct current shunt-wound motor except that the magnetic field is generated by permanent magnets inside the rotor.

With this technology, EC motors and fans can be easily controlled, are maintenance-free, offer outstanding efficiency and have a considerably long service life. The variable speed range possible in EC technology makes using a multitude of individual models a thing of the past.

Our R&D efforts are not only focused on saving energy. In terms of air performance and low noise, our products exceed the toughest specifications. EC technology pays off for every owner or operator, while conserving precious energy resources. When you use intelligent ebm-papst EC technology in your applications, everyone wins - companies, customers, and the environment.



# Fans and Their Function



## Plenum fans/K-modules

*Medium flow rate at medium pressure*

The plenum fan is the easiest to integrate into a system. Plenum fans are driven by energy-saving EC external rotor motors with drive capacities between 400 W and 6 kW. The position of the impellers on the EC external-rotor motors have also been optimized in terms of aerodynamics and installation requirements.



## Radial fans

*Medium flow rate at medium pressure*

If the required cooling air has to be turned 90° or if the system resistance is too high for an axial fan, radial fans are the most effective. ebm-papst offers not only motor/blower assemblies but also radial fan packages that include the inlet ring, power connector and housing for simpler installation.



## RadiCal fans

*Medium flow rate at low pressure*

Because of the innovative contoured wheel design, the RadiCal impeller boasts higher efficiency and lower noise. The RadiCal impeller is maintenance free in any mounting position and is available as a motor/blower assembly or in a fan package for 'plug and play' installation.



## Axial fans

*High flow rate at low pressure*

Axial fans supply air flow at relatively low system pressures, without changing the air direction. The ebm-papst external rotor motor allows the impeller to be directly mounted to the rotor, eliminating the need for an external driveshaft and forming a very compact assembly. The motor and impeller assembly is often mounted into a wall plate with integrated venturi and a grill guard. This complete fan package provides easy mounting, minimal depth, low noise levels and high efficiency.



## Compact tubeaxial fans

*Low flow at medium to high pressure*

With small installation depth, low noise level and exceptional efficiency, axial fans are particularly well suited for moving air in a wide variety of devices and systems. Axial fans for the cooling of electronic equipment are mostly equipped with external housing and an electric motor integrated into the fan hub. This compact construction allows space-saving accommodation of all devices and easy installation; the flange is equipped with mounting holes. *ebm-papst compact fans are available in various IP (Ingress Protection) ratings, select models up to IP68.*

# Alternative Energy Overview

## Wind power

Wind power in the United States continues to grow every year. ebm-papst products cover a wide range of wind turbine cooling needs, from inverters and generators to nacelle, tower, blade pitch motor and gear box cooling. Decades of experience in the ventilation and air-conditioning sector enable ebm-papst to implement innovative solutions for the customer.

## Solar power

In forty minutes, the sun spills enough energy on the Earth's surface to provide the entire population of the planet with energy for one year. Solar panel generators and inverters need to be cooled in order to run efficiently. This dilemma demands a well-planned air moving design, which can be easily solved by using ebm-papst fans and blowers with EC technology.



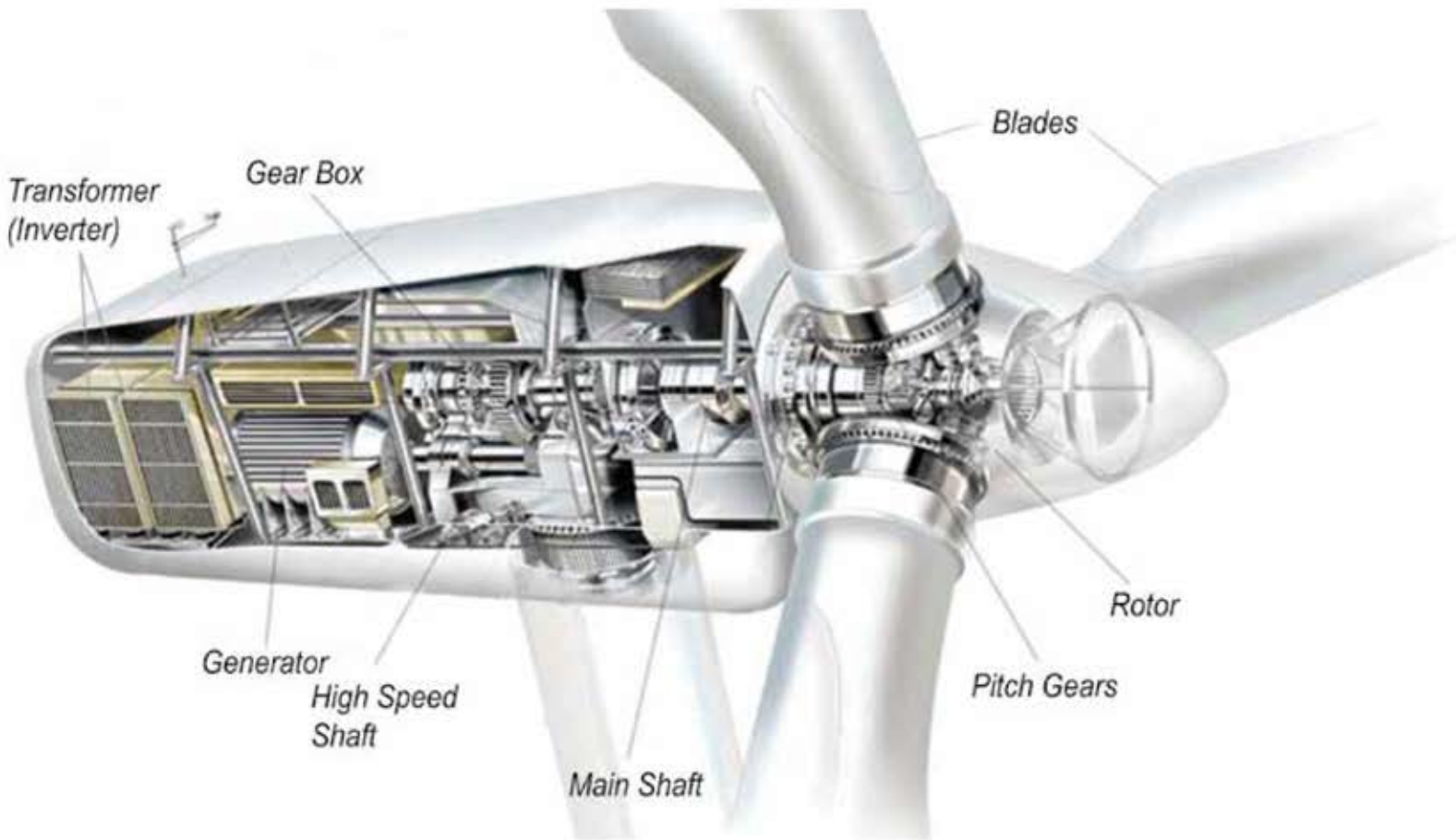
## EC, the first choice for green energy applications

Heating and cooling management is of vital importance in maintaining the efficiency and integrity of an alternative energy application. The overall design must be equipped to meet the increasing high-performance requirements for both current and future trends, all while delivering on a promise for a green design and staying within budget. Optimal cooling and ventilation of components reduces energy consumption, increases system availability and enables existing components to reach capacity efficiently and effectively. At ebm-papst, we can help meet these stringent requirements.

EC motors are increasingly the first choice when it comes to delivering energy-savings and quiet drive solutions for fans. With EC products, you have complete speed control capabilities as low as a few hundred rpm. This allows for minimum power consumption during partial load situations, such as on a cloudy or low wind day. The choice is simple, ebm-papst EC technology incorporated fans and blowers are the best solutions to deliver the results you need for your Alternative Energy applications.



# How Wind Turbines Work



## How do wind turbines work?

A single wind turbine has the potential to supply enough electricity to power nearly 500 American homes, but how does wind turn into electricity? Nacelle designs can vary in complexity from application to application, but the above diagram shows a cut away of how a wind turbine typically works. When the wind blows, the turbine blades rotate transferring the motion to the main shaft. The main shaft goes into a gear box which increases the speed of the shaft. Since the high speed shaft runs at a much higher rate than the speed of the main shaft, this allows the generator to produce Direct Current (DC) electricity. As needed, the DC electricity can be converted to AC electricity.

## Cooling wind turbines

Atmospheric and electrical component heat, along with the friction created by the internal machinery, can cause equipment to overheat and result in failures. Proper cooling of various mechanisms of the turbine can prevent that. ebm-papst offers cooling solutions for inverters and electronics, pitch drives, generators, tower air conditioning, gear units, and nacelle air conditioning.

*The new W3GZ50 series with a 1,250 mm diameter (49 in) is now available for large scale projects.*

## Fans for generator cooling

Generators have to be kept at a reasonable temperature level in order to guarantee a service life that is as long and maintenance-free as possible. Our compact and robust fans are especially suitable for use in generator cooling - even if the space is tight.

The preferred solutions for generator cooling:

- **Plenum Fans/K-Modules**
- **Single or dual inlet centrifugal blowers**
- **HyBlade® axial fans**



## Fans for nacelle air conditioning

Depending on the cooling concept and air ducting selected, we have the right fan for all requirements. Increased corrosion and vibration needs can be covered with our products. The preferred solutions for nacelle air conditioning:

- **HyBlade® axial fans**
- **Centrifugal blowers single or dual inlet**

## Fans for tower air conditioning

For cooling and ventilating the wind turbine tower, axial fans from ebm-papst are especially suitable for such high air flows and for low to medium static pressures.

The preferred solution for tower air conditioning:

- **HyBlade® axial fans**





### **Fans for gear unit cooling**

The gear unit transmits the relatively low rotor speed to the installed nominal speed of the generator. For a long service life, it is essential for the gear unit to be cooled properly. Our HyBlade® axial fans are especially well suited to this job on account of their low profile and robust design.

The preferred solution for gear unit cooling:

- **HyBlade® axial fans**

### **Fans for inverters**

In inverters, extremely tight space and a high power density are typical. The extremely broad product range from ebm-papst, along with many decades of experience in electronics cooling, ensure that no customers' wish is left unanswered.

The preferred solutions for inverter cooling:

- **RadiCal centrifugal fans**
- **Single or dual inlet centrifugal blowers**
- **Compact fans**
- **Customer-specific solutions (e.g. Fan Trays)**
- **Plenum Fans/K-Modules**

### **Fans for cooling pitch drives**

Pitch systems in wind turbines ensure that the rotor blades always work at the optimum operating point. The adjustment drives on wind turbines are an extremely important component when it comes to reliability and operating safety, especially in strong winds. For a long service life and maximum efficiency of pitch drives, efficient cooling of the drive motor is absolutely vital.

The preferred solution for cooling pitch drives:

- **Compact fans.**



# Solar Energy Cooling

## Solar power, green energy

How can a photovoltaic system save even more energy if it can generate an infinite amount from a free source? The answer lies in improving the total system efficiency and operating time. Our energy-saving EC fans offer the speed controllability and durability needed to cool the important power electronics without contributing unnecessarily to the load or reducing the reliability of the photovoltaic system. In doing so, they contribute to the cost-effectiveness of the entire solar power station.

Removing excess heat from a solar panel inverter demands a well-planned air moving design. As long as the solar array is properly cooled, it will require very little maintenance and will provide electricity cleanly and quietly for 20 years or more.



the solar panels at ebm-papst Inc.

## Fans for inverters

With compact spaces full of electrical components, it's imperative that inverters are properly cooled so the system will run at the optimum efficiency.

The preferred solutions for inverter cooling:

- **RadiCal blowers**
- **Plenum Fans/K-modules**
- **Centrifugal blowers**
- **HyBlade® axial fans**
- **Custom assemblies**

## Fans for attic ventilation

Roof and gable mounted attic fans remove trapped heat and moisture from residential and small commercial buildings.

The preferred solutions:

- **ESM axial fans**
- **RadiCal blowers**

*Ask about our fans for direct connection to solar panels.*



## Innovation and strength

For decades, ebm-papst fans have defined standards and set new benchmarks for all of the markets they serve. Our research and design engineers work every day to develop innovative technologies and new ideas, examine practical requirements and listen to the needs of our customers. Investments in research and development are the foundations on which our success is built. Our expert knowledge in the Alternative Energy industry and applications has allowed us to develop highly specialized solutions.

From the finest detail in the mechanics of the compact housing to the ingenuity of our electronically commutated motors, we have scrutinized every component until the best performance possible is achieved. At ebm-papst we see ourselves as a technological trendsetter, working every day on innovations that redefine the benchmark of what's possible. Even if that means that we have to exceed ourselves.

## Taking our commitment further

Solar power is used at the ebm-papst Inc. US headquarters in Farmington, CT. On average, 250 to 550 Kilowatt-hours of solar electricity are generated per day. The electricity that's generated is used in the engineering building to power the computers and the lighting - the biggest consumers of electricity, after the HVAC system.



solar power inverter at ebm-papst Inc. uses ebm-papst fans

