

# HyBlade<sup>®</sup> Made by ebm-papst Premium Hybrid Fan



The New Composite Material  
for Axial Fans

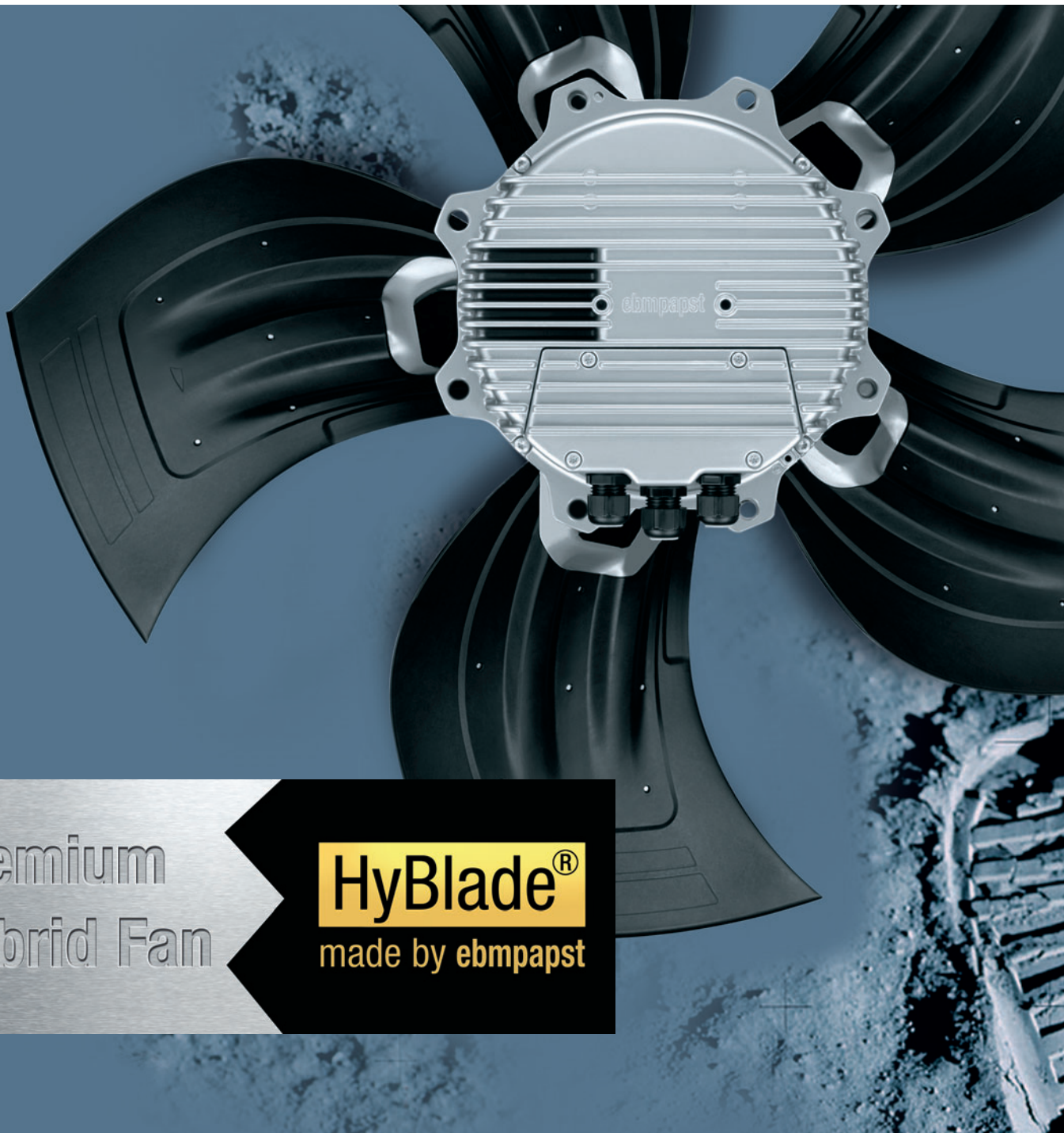


The engineer's choice

**ebmpapst**

# HyBlade® Axial Fans: Incredibly Quiet, Unbelievably Efficient

*With HyBlade®, an innovative and at the present time also a unique hybrid structure for fan blades, ebm-papst is redefining the strengths of large axial fans! Entirely new standards are set by this combination of an aluminium supporting structure and a cladding or sleeve made of fibreglass-reinforced plastic. Above all, the optimised aerodynamic shape results in enormous noise reduction while significantly increasing the efficiency compared to conventional blades.*



Premium  
Hybrid Fan

**HyBlade®**  
made by ebmpapst



### **We are taking the next step**

The advantages of our large axial fans are really nothing new in the refrigeration and climate control business. After all, ebm-papst has long enjoyed a reputation in this segment for premium quality and premium performance. However, continuously rising requirements in practice demand of us that we never cease to conduct new research into fan technology capabilities. The primary requirements are for the maximum possible airflow rating at the lowest possible noise level.

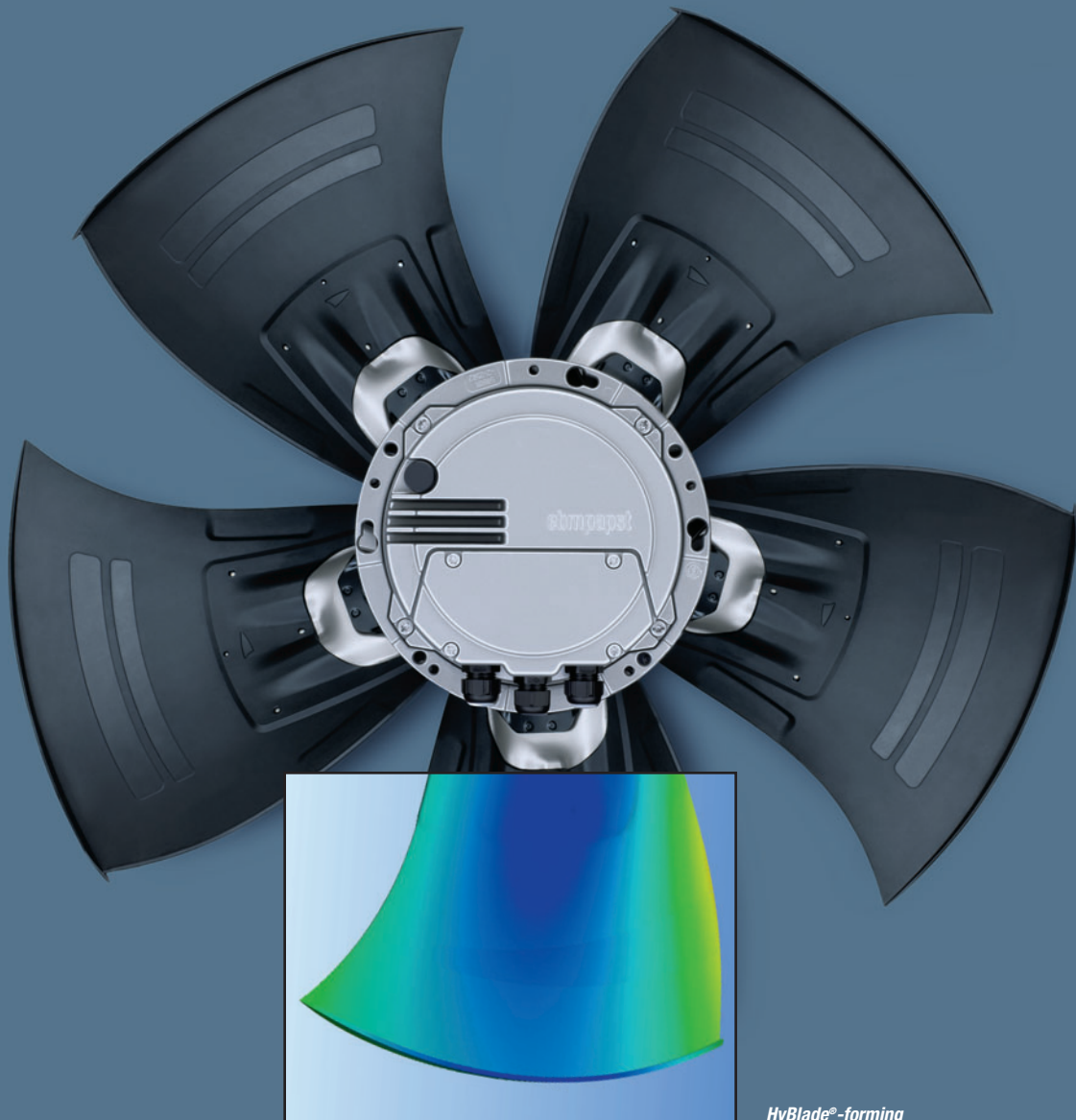
However, the specification profile our developers set themselves also included an optimised efficiency rating, improved corrosion protection, reduced weight and environmentally-aware production with a favourable energy-to-output ratio. For this reason, we are never satisfied with small facelifts or with an evolution of the familiar. For this next stage in development, we are taking a giant step forward. The outcome is genuinely impressive: HyBlade® – a term embodying the notion of raising the bar very long way indeed in many disciplines, and setting the next set of milestones for the fan technology sector.

### **HyBlade®**

- ▶ **Massive weight reduction**
- ▶ **Ultra-efficient blade profiling**
- ▶ **Revolutionary noise reduction**
- ▶ **Substantial improvement in efficiency rating**
- ▶ **Significantly more environmentally compatible production**
- ▶ **Available in AC and EC technology**

# Stability and Intelligence to the Power of Two: HyBlade® Meets EC Technology

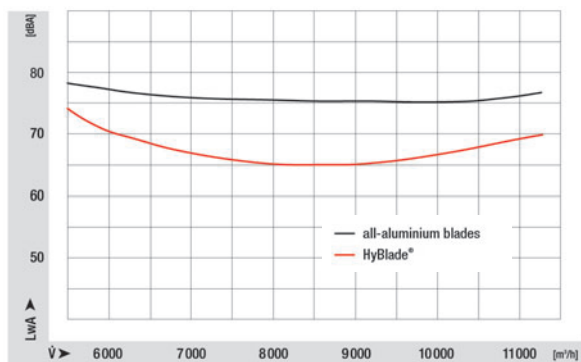
*HyBlade® combines the benefits of two contrasting materials in an ultra-efficient manner. Through this intelligent combination, new advantages emerge, while existing benefits are further enhanced. Above all in conjunction with ebm-papst EC motor, HyBlade® fans become true pioneers of efficiency. Their limitless range of application has delivered firm evidence of how well this new technology is able to contend around the world.*



*HyBlade®-forming*

### One and one make one

Intensive research for improvements in the geometry of the blades of large axial fans has led to a revolutionary new hybrid concept. In the world of technology, “hybrid” always means a combination of different elements. The special feature of this is that even the initial elements can depict a functioning solution. However, only when they are combined do new, positive characteristics emerge from the original benefits.



Noise comparison

### EC – two letters for energy efficiency

EC technology is the key foundation of our energy-efficient motors: on average 30 % less energy consumption, up to 70 % for some applications – that is a word. The controllable drives are bus-compatible and besides saving energy achieve a superb level of efficiency of up to 90 %. In addition, they are completely maintenance-free and have a much longer service life.

### This is where HyBlade® really scores

The stability of an ultra-strong aluminium alloy inside combined with the lightness and unrestricted malleability of plastic on the outside – that is the ingenious combination which characterises HyBlade® technology. While the corrosion-resistant aluminium structure in the core of the HyBlade® blade assures a permanent connection with the rotor, the external sheath of fibreglass-reinforced plastic imbues the blade with an aerodynamically optimised shape.

First of all, this lightweight mantle initially has a substantial and positive impact on the total weight of the fan, and also helps to reduce noise levels through its favourable damping characteristics. The most important thing however is this: Whereas sheet metal components can only be adapted by means of stamping, bending or embossing, plastics are no problem to turn into three-dimensional shapes. Optimisation of the blade design therefore no longer faces any obstacles – even down to the level of minute detail. Even winglets on the blade tips, of the kind now familiar from motor racing and aircraft design, are now an easy matter to accomplish. These have an aerodynamically favourable effect and minimise turbulence between blade and housing, thereby also enabling the fan to operate even more quietly and with a higher efficiency rating.

### Overall impression: excellent

The outstanding characteristics of HyBlade® technology have also made a lasting impression with prominent independent institutions. In early 2008, HyBlade® was awarded the iF material award (iF International Forum Design GmbH), a prestigious award for excellent material solutions.



material  
award

2008

# Perfection for Our Ecology: HyBlade® and GreenTech

*The cornerstone of our ebm-papst philosophy has always been to produce high-quality products without causing damage to the environment and to go for sustainability. For decades, our innovative strength has been geared toward making ecological and economical interests meet in one ultimate productline – HyBlade®, putting one ultimately perfect seal on our corporate philosophy: GreenTech.*



**We follow a firmly held conviction:** GreenTech by ebm-papst means that we will remain true to the philosophy of our founder, Gerhard Sturm, with the same commitment we have shown for decades: “Each new product we develop has to be better than the last one in terms of economy and ecology.”

**We develop pro-actively:** We optimise materials and processes for eco-friendliness right from the start. We continually improve the material and performance of our products, as well as the flow and noise characteristics. At the same time, we significantly reduce energy consumption. Close co-operation with universities and scientific institutes allows us to profit from the latest findings in research and support young academics at the same time.

**We produce in an eco-friendly manner:** In our production processes, intelligent use of industrial waste heat, photovoltaics, and our own air-conditioning and ventilation technology are of utmost importance. Our most modern plant, for instance, consumes 91% less energy than is actually specified and currently required (by EU law).



**We are acknowledged and certified:** There is public recognition for the positive environmental impact of our chain of production. The 2008 Environmental Prize of Baden-Wuerttemberg, the Green Award 2009, the Energy Efficiency Award 2009 of the dena and many other awards bear testimony to this. On top of this, our products are already well below the thresholds future energy legislation will impose – in many instances, even by several times over.

**Our customers profit every day:** All ebm-papst products feature an excellent balance of economical and ecological needs. EC technology at the heart of our most efficient products easily results in maximum efficiency of up to 90% and brings energy consumption down to a comfortable minimum. All this pays off for the user – 100%!



For fans with an input capacity of greater than 125 W, the new European Energy-related Products Directive (ErP) to improve energy efficiency will enter into force in 2015 at the latest. Thanks to groundbreaking GreenTech EC technology, all of our ebm-papst fans and motors in these performance classes exceed the ErP Directive even today.

# First-Class Energy Balance: HyBlade® in Day-to-Day Operation

*Our axial fans in HyBlade® technology have outstanding characteristics in every respect, bound to turn them into the future benchmark for industry due to their responsible use of resources, their soft impact on the environment in terms of noise – or simply because they are so easy and quick to install. One other factor gaining in importance day by day is their very positive primary and secondary so called “energy balance” (EU rating for energy saving).*



## **Power delivered in silence**

As we see it, environmental protection should also be extended to include noise management. Particularly in the case of large axial fans which are frequently found outside buildings, plying their trade inside heat exchangers, it is important to keep noise at an absolute minimum. Here, HyBlade® with its optimal adjustability in terms of blade geometry is an ideal solution. As the glassfibre reinforced plastic is enormously flexible, the impeller can be easily adjusted to meet different operating specifications. These new aerodynamic characteristics reduce noise levels to a minimum and help to make HyBlade® fans some of the quietest fans in their class.

## **Lightweight for easy handling**

Another ace in your hand: ease of installation of HyBlade® fans! Yes indeed, it is remarkably easy to install HyBlade® fans. It is genuinely true to say that changing from conventional fan designs to new fans equipped with HyBlade® technology is superbly uncomplicated. These devices have the same dimensions, mounting flanges and connections as previous models. This means that they are technically fully compatible and this makes the changeover process as easy as never before. In this respect, the lighter weight of the assembled final units has an important role to play, enabling operating staff to make light work of installing this new equipment.

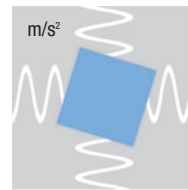
## **Potential energy saving in terms of raw materials – an example**

For one, the substantially lower weight of the finished HyBlade® fans reduces the fuel consumption during transport to the final location. However, the really significant saving in energy is achieved during production of the eminently recyclable raw plastic material and the subsequent processing culminating in the finished product: in every respect. HyBlade® is vastly superior to results achieved by comparable fans based on conventional designs.

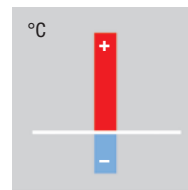
The electrical energy input required to generate one kilogram of primary aluminium is approx. 15.4 kWh; this does not even take into account the fuel input (source: “Material efficiency: potential savings during the manufacture and use of energy-intensive raw materials.”, German Federal Ministry of Economics and Technology). In contrast to this, one kilogram of plastic (PA6) requires only about 1.8 to 1.9 kWh (source: European Commission JRC, EU dated Oct. 2006). This calculation proves that here at ebm-papst, technical innovation does by no means require additional consumption of resources. On the contrary. Exactly the opposite is true!

# Elementary Efficiency: HyBlade® in Endurance Test

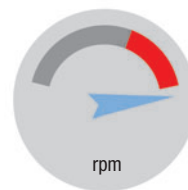
*HyBlade® technology has proved it can withstand all these conditions easily and can be operated in all climates. This ultimate proof of excellence is based on our new blades being subjected to vigorous testing and still being run under the most extreme operating conditions in closely monitored test applications around the globe.*



**Vibration load and shock impact**



**High temperature,  
strong thermal fluctuations**



**Speed overload up to 300%**

## HyBlade® vs. the elements

As you would expect, every new product at ebm-papst is tested vigorously before it goes into serial production. This is particularly true for a new material compound never seen in the world before and certainly true for our new HyBlade® technology. Our quality standards are therefore extremely high. In our research and testing facilities in Arizona, Singapore and Siberia, the design advantages and performance capabilities of hybrid technology are being tested under the most arduous conditions. Due to the fact that these locations experience extreme climatic conditions all year round, they provide ideal environments for our endurance tests.

## Tested and found to be excellent

In addition to long-term fatigue tests and high speeds up to well over three times the maximum operating points, the new hybrid blades are also exposed to water, salt spray fog and chemicals – and able to pass these tests due to their outstanding corrosion resistance. Moreover, the material structure quite literally cannot be shocked when subjected to severe vibration and shock loadings. This ensures that HyBlade® fans are also able to meet the most demanding applications and to deliver extraordinary quality standards, something for which ebm-papst is renowned throughout the world.



# “HyTech” starting at 300 mm: the expanded HyBlade® product range

The HyBlade® product range features a large number of combination options. For the main applications of heating, ventilation, refrigeration and climate control, fans are available with AC or GreenTech EC motor variants. The addition of the small 300, 350, 400 and 450 series, which are used primarily in evaporators, ensures optimum adaptability of the product series to your individual requirements.



## Ideal partners: HyBlade® and EC technology

The revolutionary characteristics of the hybrid structure include intelligent controllability, freedom from maintenance, a long service life and the excellent energy efficiency of EC drive technology. EC HyBlade® fans thus achieve an unrivalled overall level of economy.



Type	Fan diameter	Motor size
	mm	mm
AC	300...990	68...138
EC	300...990	55...150

*HyBlade® axial fans – quieter and more efficient than ever before. Learn more about this revolutionary development for refrigeration and climate control technology. At the same time, inform yourself about what ebm-papst products and engineering services can contribute to the success of your applications. We look forward to hearing from you.*

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