

mag^o

all about ebm-papst

01° 2009



A crafty draft

Wind power plants by Vensys are at full throttle and self-cooling explains Tanja Maringer

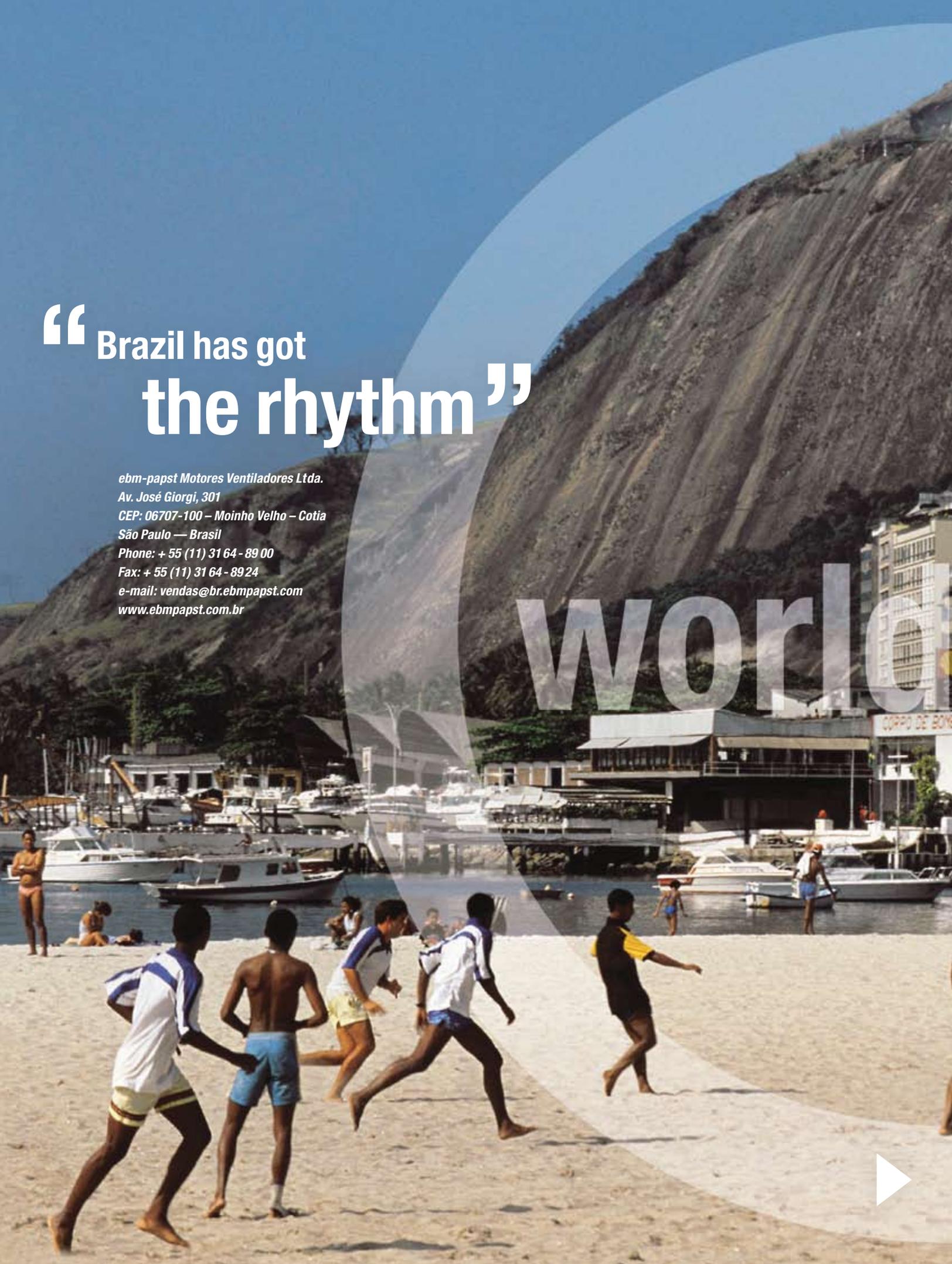
° 15 Super supermarket: Customers and purchasers benefit from ESM ° 16 Long-term vision: Job rotation connects the company ° 18 Driver's paradise: In the A4, an intelligent system assists steering ° 22 Medical technology: Good care in hospital

ebmpapst

“Brazil has got
the rhythm”

ebm-papst Motores Ventiladores Ltda.
Av. José Giorgi, 301
CEP: 06707-100 – Moinho Velho – Cotia
São Paulo — Brasil
Phone: + 55 (11) 31 64 - 89 00
Fax: + 55 (11) 31 64 - 89 24
e-mail: vendas@br.ebmpapst.com
www.ebmpapst.com.br

world





Innovation vaccine

Thomas Borst
Managing Director Sales
Group Management

Dear reader, by now, one could not have failed to notice that a problem in the abstract financial world has brought about a crisis in the real global economy. And we at ebm-papst are aware that there are industries and market segments that will be less harmed by the crisis than others. The vaccine is called innovation, which is at the core of our corporate strategy: ebm-papst is an innovative company. But this most certainly does not make us immune to the varied effects of the current problems. Our power of resistance is high and we are passing on this strength. With pioneering products and solutions that in turn support you in quickly placing your own innovative products and solutions into the marketplace. The development of new solutions carried out together with our customers, is a practice that has proven its value for years and brings success particularly in these times. The impetus to employ renewable energies from the air, water or sun also puts a lot of wind in the sails for our company.

A current example of this is the energy-efficient cooling of frequency inverters in wind turbines, you can read more about this on page 10.

We have also made good preparations in our traditional markets of air-conditioning and refrigeration technology. For instance with the second generation EC technology, a new modular unit assembly system for the motor, electronics and design of fans as well as an enhanced intelligence with new control functions. This provides ebm-papst with the right response to pressing demands for energy savings, such as those placed by the new America under President Obama. In the next ten years the USA wants to invest approximately 150 billion euros in alternative energy sources, and their proportion of the power supply is to increase to 25 percent by 2025. This political U-turn must not be allowed to be merely a driver of growth for all companies active in this field, rather it is also a signal for the rest of the world.

22



10



21



01° 2009
mag

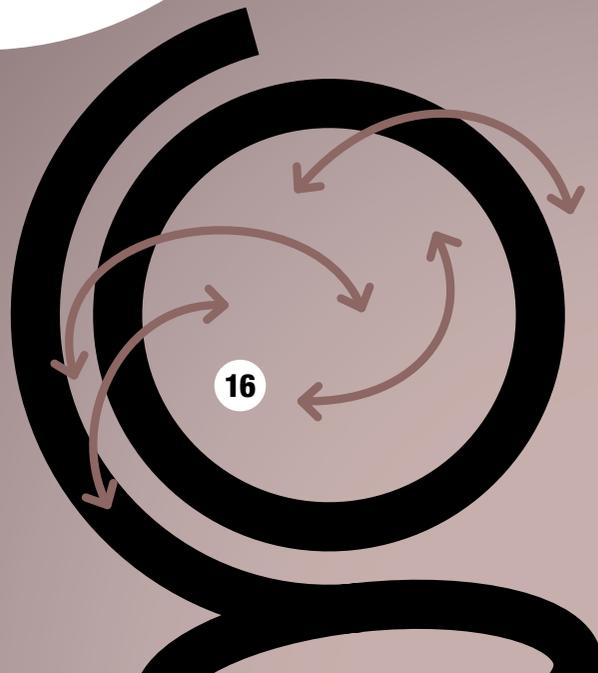
07



18



16





360°

- 06 // Sigmar Gabriel
- 07 // Packed full of ideas
- 07 // New strategist
- 08 // Award-winning green
- 08 // For the welfare
- 09 // New products

10 Self-cooler

For Tanja Maringer, clean energy is crucial: the wind-power stations from Vensys save energy, that they themselves produce in large quantities, using EC technology

15 “Measurable saving-success”

Two brothers refurbished the refrigeration units in their supermarket to EC: that is more economical and customer-friendly

16 Job Rotation

Go further beyond the horizon: international job rotation makes people more sensitive in dealing with foreign cultures

18 The adaptive steering

More driving security and at the same time more driving fun? An innovative steering system in the new Audi A4 makes it possible

21 Circuit with stone

Ready and dry for the cupboard: with the thirsty mineral zeolite, dishwashers with active drying are even more effective

22 The health system

In hospitals, ebm-papst technology is hidden in medical devices everywhere: from the roof to the basement

Columns

- 24 **tech.talk** // High level of accuracy
- 25 **Service** // Trade fairs & dates, tech.mag, imprint
- 26 **Over the fringe** // Little children, clever heads
- 27 **worldwide** // The rhythm of Brazil





German Environment Minister Sigmar Gabriel has appointed ebm-papst to the Environmental Technology Board established in 2006

2 Questions to Sigmar Gabriel

1. What would you like to see in the German economy to cope with the ecological challenges?

The German economy has already recognised in some areas that the basic conditions of economic activity have changed and that corporate strategies as well as business models have to be realigned. The consequences of the climatic changes as well as the shortages of raw materials and energy as well as the increase in their costs are already clearly noticeable. I would like to see three things in the German economy: firstly, for it to seize upon the challenges in the environmental and climatic arena as primarily being an opportunity for success; secondly, for it to seriously tackle the topic of "efficiency" (the catch-phrase is: to produce "more" goods with "less" environmental resources); and thirdly, for it to use the great opportunities in the future markets of energy efficiency, sustainable water management, sustainable mobility, power generation, raw-materials and material efficiency as well as waste and recycling management for economic success, employment and qualification. Our ambitious environmental policy has created important prerequisites for ensuring that German companies are multiple market leaders and that the German economy assumes a leading position in the export of environmentally protective goods.

2. What can the economy expect from politicians in this aspect?

We are focussing on innovation, more climate protection and resource efficiency, and the creation of new long-term jobs. We shall continue the route pursued in our ecological industrial policy. One fact is clear, as our recent environmental report also showed: good environment creates good work. Particularly in the current crisis we must focus on sustainable investments and jobs with long-term security. I am sure the climate protection initiative launched last year will prove to be an effective instrument as part of the German government's economic stimulus plan. And for this reason, I shall continue to engage with the economic sector for a sustained modernisation of our society.

News in brief

ebm-papst was awarded the **Energy Efficiency Award 2008** by the Association of European Refrigeration Compressor and Controls Manufacturers (www.asercom.org) for development of the HyBlade® axial fans and the new generation of energy saving fans. Innovative and extremely energy-efficient concepts in the air-conditioning and refrigeration technology were acclaimed.

The Canadian company **FuelMaker** makes it possible to fill up the natural gas car at home: natural gas with a low compression is needed to heat a house and with high compression to fill a car, this has prevented the joint usage of gas before now. The FuelMaker appliance also uses a radial compact fan made by ebm-papst to compress the natural gas from a household and therefore add a filling station to a home.

ebm-papst will be presenting the new **VDC-3-49.15** external rotor motor at the Hannover Messe in April. It features a high power density, integrated 4-quadrant controller electronics with extensive functions as well as a sturdy design, and permits multiple usage options in industrial drive and automation systems.

Super-fast PCs, PlayStation 3 and the "Roadrunner" super computer in Los Alamos achieve their maximum speed with the IBM Power XCell 8i Accelerator Board. And ebm-papst has developed the matching radial compact fan so that the **lightning-fast board** does not start overheating too fast.



These figures convinced the jury: 85 percent efficiency, 670 m³/h output, 1,400 Pa pressure at only 140 x 140 x 51 mm. At the electronica trade fair the S-Force 5300 won the **Oscar of the electronics industry**: the Elektra Award is awarded annually to those companies that fulfil ultimate technical standards and promote developments.

Packed full of ideas

Mulfingen is home to the landmark of ideas

ebm-papst has won in the “365 Landmarks in the Land of Ideas” initiative. There were around 2,000 entries for the nation-wide competition under the patronage of the German President Horst Köhler. 365 landmarks from these entries were selected in which the most futuristic ideas are developed, promoted and actively implemented. ebm-papst convinced the jury with its EC technology which gives fans savings potentials of up to 70 percent electricity. The official awards ceremony will take place on 16 June in the new “green” plant in Hollenbach.



The new green site at Hollenbach is part of the “Land of Ideas”

**New man
at the head of
ebm-papst
St. Georgen:
Dirk Schallock**



New strategist

Dirk Schallock heads St. Georgen

In St. Georgen a new man is at the helm since the beginning of this year. Dirk Schallock is the new Managing Director of the site in the Black Forest. The 42-year-old managed Bühler Motor GmbH in Nuremberg for six years, during which, he established the company with international dimensions, introduced new innovation and technology management and therefore markedly improved the market position for the company during his time as Managing Director. The strategist from Franconia therefore brings much experience into drive engineering and will quickly familiarise himself with the fans division. Rigid structures and inflexible hierarchies do not impress Schallock too much, he favours free space for creativity and will use this to strengthen the motivation of all employees. “We have to work together to find the direction ebm-papst St. Georgen must find in coming years in order to survive and thrive in the marketplace.”

8 power stations
run throughout the whole of Europe only for the energy supply to fans and their drives.

30%

of the electricity used in business and industry is consumed by pump motors. The cost reduction potential in the optimisation of pumping systems is just as high according to the Deutsche Energie-Agentur (dena) — the German Energy Agency.

From **2011** minimum efficiency classes currently being specified in the Ecodesign Directive are to apply for electric motors.

26 billion kWh

electricity (equates to the output from four coal-fired power stations) could be saved in one year throughout the whole of the European Union if all industrially used fans were replaced by the up-to-date ebm-papst EC technology.

€ 17,068

per year can be saved by using EC centrifugal fans in a high-rise building with 600 fans as compared to the conventional technology. This equates to an emission reduction of:

81 tons CO₂

¹ Based on the outline directive 2005/32/EC — Energy using products directive
² At an electricity price of 12.55 euro cents per kilowatt hour // Sources: ebm-papst; dena



Minister Tanja Gönner presents Thomas Wagner (right) and Markus Mettler (left) with the Environment Prize of the State of Baden-Württemberg

Award-winning green

ebm-papst receives Environmental Prize

ebm-papst has received the Industry Environment Prize awarded by the State of Baden-Württemberg. “The jury was impressed with the exemplary and comprehensive implementation of environmental protection in all areas of your company, as well as the outstanding integration of employees,” said the Minister of the Environment Tanja Gönner in explaining the decision. In addition to the production of energy-efficient and quiet EC fans, the wide-ranging commitment exercised by the company was also decisive. Due to anchorage of environmental protection as a corporate objective at all worldwide locations, high standards are applied in such a way, as part of the buying process for instance, to take into account the effects of new equipment on the environment. The environmental management is certified

compliant with the ISO 14001 standard, stressed Gönner at the presentation of the prize to the Environmental Officer of the Mulfingen plant, Markus Mettler, and Thomas Wagner, Managing Director Production, ebm-papst group.

The new plant in Hollenbach even produces an energy surplus thanks to waste heat utilisation, a photovoltaic plant and the use of EC fans. Additionally, around 19,000 square metres of roofing is vegetated and an energy management professorship is endowed. “Correctly understood, ecology does not cost money — it saves money,” the minister said of the energy efficiency initiative of the “Hohenlohe model,” in which ebm-papst actively participates as a founding member. The prize is awarded annually to companies in the state in the four categories of industry, trade, services and handcraft.

Want to know

The youth researches regionally with ebm-papst

The sponsor company ebm-papst is again inviting entries to the regional “Youth research” competition held in early March. Over three days, 61 works from 162 participants will then be viewed at the Reinhold-Würth-Hochschule under the motto “You want to know” in a contest of ideas — a record-breaking number of registrations. The vast majority of young researchers comes from the Heilbronn-Franken region, but clever heads from the German School of Milan will also take part in 2009 for the fifth year in succession. Placings for the state-run competition will be notified by the jury of 35 experts from the seven specialist fields as early as the evening of 5 March. On the second day the jury will announce the special prizes, and on 7 March all works will be presented to the public. The length of three days is a special feature of this regional competition that is open to the public on Saturday, a day that has become a firm tradition and is always well visited.



Brilliant prize winner: Gerhard Sturm

For the welfare of everyone

Gerhard Sturm receives the Diesel Medal

The Curatorium of the German Institute for Inventions honoured Gerhard Sturm with the highest distinction for economically successful inventors, the Diesel Medal. In his laudatory address, Dr. Manfred Wittenstein, President of the VDMA (German Mechanical and Plant Engineering Association) praised Sturm for creating a global company through his concentration on technological peak performance combined with a humane corporate culture. In memory of Rudolf Diesel the Medal is awarded at irregular intervals to entrepreneurs whose pioneering inventions have contributed to the welfare of society. In addition to the technical brilliance of the prize winner, the honour also pays tribute to his or her importance to the national economy, and it has the purpose of inspiring young inventors and entrepreneurs to pursue their path unwaveringly.

For more information please go to: www.ebmpapst.com/product-news

ENDURING LIGHT

More and more car makers are opting for high-power LEDs for headlights. Because they have high efficiency and need little installation space. But as the active chip surface is small, it has to be cooled well. ebm-papst has developed a special fan for this purpose that copes with permanent vibration, acceleration and fluctuations such as a wide temperature range. The durable fan also delivers high air performance and high pressure build-up with minimum power input.

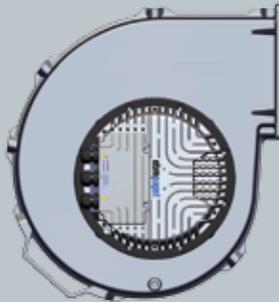


Forward backward

The Plug Fans line has been fully revised: seven aluminium backward-curved blades now rotate in the impeller of the EC radial fan. The optimised blade geometry with a slanted trailing edge improves the aerodynamic performance and running smoothness. The service life is designed for a running time of at least 40,000 hours. The eight sizes with impeller diameters ranging from 250 to 560 mm and drive outputs from 400 Watt to 6 Kilowatt could therefore save cold hard cash with their new appearance and EC technology.

EC technology

Wherever EC is on the label, EC is inside. Anyone who uses the EC technology from ebm-papst can now show this with the EC seal. Ask your sales contact.



Hot, hotter!

The new G3G250 gas blower extends the existing line upwards and is designed for maximum heat outputs of 1 megawatt. This now makes it very easy for customers to extend the present 700 kW limit, as the new blower falls back on the former housing and the tried and tested impeller combination.

New standard

The second generation of the 150-series EC motor sets standards: it offers a significantly increased function range, is now also available with 6.0 Kilowatt power in addition to the 1.7 and 3.0 Kilowatt versions, is greatly more resistant to weather, and its updated cooling fin design gives it improved self-ventilation.



COSY POWER

The new radial blower with integrated mass flow sensor constantly supplies fireplaces and hearths with glass screens with exactly the quantity of atmospheric oxygen they need for all fire capacities. This means adjustment onsite is no longer necessary.

Self-cooler

In the Saarland, wind-power stations are being developed and built that are reliable and set new standards with self-cooling forces — using EC technology.

Alone on the hill, the rotor of a wind-power station is rotating at a height of 69 metres. There's quite a breeze blowing over Sitzerath in the north of Saarland. The screen of the installation control system indicates a wind speed of between 5 and 15 metres per second. Inside the steel tubes, that sounds like the groaning of a heavy worker. However, the humming is the satisfied sound of one of the lean giants rotating almost at its rated speed, known by the name of VENSYS 62 — the prototype from VENSYS Energy AG set up in 2003.

Our landscape is no longer conceivable without wind-power stations. However, they are not uncontroversial: too loud, too much shadow, too ugly is the criticism of many action groups and local communities. Yet beside these objections, wind-power stations provide great advantages: safe, almost environmentally neutral — and easy to maintain, being designed for longevity. “We simply left out much that could break”, explains Tanja Maringer succinctly. The stations, which are being developed in the Saarland, are simple, durable and reliable and will soon also be produced at the new location in Neunkirchen. →



These innovative stations by VENSYS are easy to handle: missing wear parts and self cooling-systems are brilliant arguments for sales assistant Tanja Maringer

**Tanja Maringer knows
for sure: “To think green
means to think economically.”**



Wind energy

Wind power has already been put to use for the benefit of man for centuries. But only with the oil crisis at the start of the 1970s did the necessity of generating electricity from wind energy become apparent. At that point, the history of the development of wind-power stations was almost a century old. In 1891 the DanePoul La Cour was already developing a precursor, from which 72 installations in Denmark were supplying electricity in 1908. The prototype of modern wind-power stations was developed by the German Ulrich Hüttner in the mid-1950s. His installation had a rotor diameter of 34 metres and an output of 100 kilowatts. Since then, installations of 135 metres in height and with an output of up to 6 megawatts have been erected.

However, the so-called harvest rate of wind-power stations is limited: only maximum 59.3 percent of the wind can be converted into mechanical power according to the Betz factor which was devised by the physicist Albert Betz in 1926. The reason for the limited utilisation is that the wind slows down when it acts on the rotors. Behind the installation, however, the same mass of air must continue to flow — so, part of the wind evades the installation and is not harnessed.

Wind-power stations currently provide almost 7 percent of the power requirements in Germany. There are various studies into the potential for increasing this share of the energy mix, varying from 20 to 60 percent.



**A good idea, a better realisation:
wind-power stations then and today**



The installation screen control shows wind speed, kilowatt hours and can be actuated via Internet

Maximum efficiency is thanks to the innovations that VENSYS has developed and integrated in its wind-power stations. The core of the gearbox-free wind turbine, of which the prototype was tested in Sitzerath, created a new state of the art, innovative generator technology. The generator is based on permanent magnet technology, which already existed for electric drives, but

Wear parts and susceptible components have been eliminated.

was now put into use for wind-power stations as well. With this external rotor motor generator, a charged field is created by permanent magnets made of neodymium-iron-boron.

The main feature of this technology is that wear parts and susceptible additional components, such as collector rings to transfer the generated power, have been eliminated. The generator is perfectly protected against environmental influences. In addition, the power for the generator itself is saved, making it fully available as energy output — the electrical efficiency is outstanding.

With conventional technology, using a gearbox between rotor and generator, the power train is subject to extreme stress. In the worst case, the gearbox needs to be replaced after five to ten years — an expensive measure. The new gearless robust technology makes the VENSYS system, which is designed for a service life of twenty years, a low-maintenance and reliable alternative. The technology shows some amazing parallels with the EC motor developed by ebm-papst. Here too, a brushless, external rotor motor actuated by permanent magnets foregoes the need for components that wear and at the same time offers decisive advantages: simple controllability, durability, compactness — and up to 90 percent efficiency.

The gearbox-free technology in the wind-power station challenged the creativity elsewhere on the part of the developers, too: “We needed a suitable frequency inverter to transfer the electricity generated to a constant voltage and frequency”, explains Maringer, adding that the VENSYS frequency inverter

VENSYS Energy AG

- 1990** Forschungsgruppe Windenergie
- 2000** VENSYS Energiesysteme GmbH & Co. KG in Saarbrücken
- 2007** VENSYS Energy AG
- 2008** Moving to Neunkirchen

When the wind energy research group was founded at the Saarbrücken College of Technology and Business in 1990, nobody realised that just ten years later there would be a successful spin-off. For after the group had successfully developed a gearbox-free wind turbine with an output of 600 kilowatts for the company GenesYS, five members decided that they could themselves develop and construct installations. In the year 2000, therefore, the company VENSYS Energiesysteme GmbH & Co. KG was founded in Saarbrücken, with the prototype VENSYS 62 which has an output of 1.2 megawatts. The young company won its first

licensee: the firm Goldwind in China, which today with 70 percent is the largest shareholder. Over the following three years, a further installation type with an output of 1.5 megawatts and four more licensees were added. In 2007 the company changed its name to VENSYS Energy AG. In 2008 the subsidiary VENSYS Elektrotechnik GmbH in Diepholz started with production of the self-developed frequency inverter. In August 2008, the 40 employees moved from Saarbrücken to Neunkirchen and started their own production with ten new employees. By the end of 2009 it is intended to double this number and to have built 20 installations.



At the new site in Neunkirchen the future shines bright: in the new workshop production is starting off — viewed by engineer Mike Becker, Winfried Schaefer of ebm-papst and Tanja Maringer (left to right)



The EC axial-fan draws the cool air from the tower top through the components and blows the warm air outside the basement

is made by a subsidiary in Diepholz. A large number of semiconductors work in this frequency inverter — and they get hot, just like the transformer, which is also accommodated in the base of the tower.

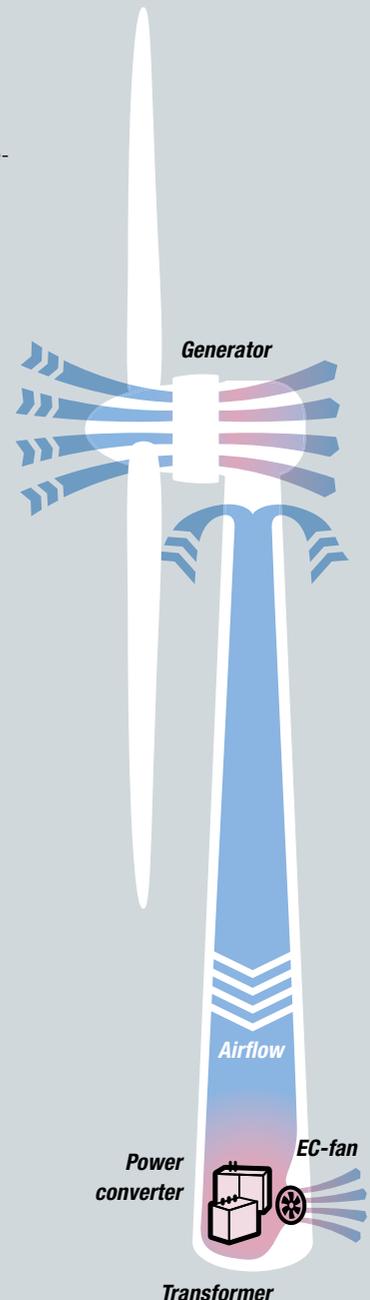
Self-cooling power At this point, VENSYS and ebm-papst came together: “VENSYS approached us about the development of component cooling in the tower base”, recalls Winfried Schäfer, Regional Sales Manager at ebm-papst. About five years ago, the then Manager of the Electrical Department, Dr. Stephan Jöckel, had a groundbreaking idea: Why not use the clean, cool air available at the top of the tower to cool the frequency inverter and transformer in the tower base, and the generator? However, a stimulus was required. This was now provided by an EC axial fan in the tower door. The EC fan in the tower base generates a slight underpressure, which is sufficient to draw the air flow down through the entire tower to the base — a kind of reversed chimney effect. The air mass flow is directed via a distributor on the inverter cabinet to the air-conditioning components of the PCBs inside — which also accommodate further ebm-papst EC fans. Behind and below the inverter cabinet, the air is drawn further to the transformer and finally blows warmth out of the tower base, making this an extremely economical system of self-cooling forces. In addition, in the forth coming WPS generation, the EC axial fans will be equipped with HyBlade® blades. They combine the stability of a high-strength aluminium alloy with the light weight and unlimited mouldability of fibreglass-reinforced plastic.

He who thinks green thinks economically Yet one might think that who ever is at the source need not necessarily save energy. However, Tanja Maringer disagrees: “He who thinks green thinks economically.” For the Renewable Energies Law (EEG) guarantees the operators a fixed supply payment of currently 9.2 cents per kilowatt hour. With an investment sum of approximately 2 million Euro per installation, the use of energy-efficient components is absolutely worthwhile. “We are therefore concerned that our installations themselves use as little power as possible”, concludes Maringer. Previously, we did not directly approach potential operators with these competitive advantages, as the company acted primarily as a licensor. In the past five years we have gained licensees in the Czech Republic, Spain, India, Brazil and above all in China. Meanwhile, 270 installations are operational worldwide, but the Chinese partner alone is planning a further 1,000 installations this year. Since the start of this year, VENSYS has been producing at the new company headquarters in Neunkirchen itself. First of all, the 20 installations planned for 2009 will be produced by order for the German and European markets. ○



Technical Data

The axial fan has a free-blowing air output of almost 22,000 m³/h. The use of winglets reduces the split current at the blade tips, which minimises noise. The better efficiency of the EC motor reduces the self-heating, thus increasing the service life.



“Measurable saving-success”

Cooler, more economic, greater customer friendliness. The Nüsken brothers save energy which also optimises service in their supermarkets.

Eating is a sensory pleasure — but unfortunately buying food is often not. Marcus and Karsten Nüsken prove that this can be different in their seven Rewe supermarkets in Westphalia. The brothers explain how they managed to use EC technology to catapult one of their supermarkets into the top ten supermarkets in Europe.

Mr Nüsken, last year you fully refurbished one of your supermarkets and equipped it with new refrigeration units. How did EC motors come to be considered?

Marcus Nüsken: Our supplier for refrigeration units informed us of the savings potentials promised by the new ebm-papst fans. This convinced us that it is more worthwhile to accept higher procurement costs in the long term, because energy costs impact directly on my balance sheet. We converted all cooling units in the new supermarket to EC technology in one go, and the savings success was immediately measurable: despite a larger refrigeration configuration the consumption has fallen considerably. This impressed us. We have gone over to EC fans in three further supermarkets, and when I compare the overall power consumption it is apparent that these supermarkets have a far more efficient energy consumption.

Did you have ideal examples for your energy-saving measures?

Karsten Nüsken: No. Merely the trend in energy prices worried us. We thought about what we could

do to keep the energy costs low in the long term. At first we had very practical ideas that showed great effect.

For instance?

Marcus Nüsken: Our heated cashier stations in the entrance area: it is often really uncomfortable at the doors. Above all in the period as the weather turns cold and the heating is not yet switched on. Therefore, instead of routing the waste heat from our cooling units out over the roof, we directed it into a water tank and transported it to the cashier stations. After all, we are speaking here of energy to the extent of 5,000 to 7,000 kW. Our cashier team no longer freeze and are very rarely ill.

You have implemented some innovative service ideas in your new supermarkets. Are you saving energy to make investments elsewhere?

Karsten Nüsken: No, first and foremost we are of course saving energy to increase the efficiency of our supermarkets. On the other hand however, we are using the benefits appropriately somewhere else. We would like to turn shopping into an experience, because shopping also increasingly means communication. The elderly in particular not only go into a supermarket because they need things, they go there as a diversion, for entertainment. We care

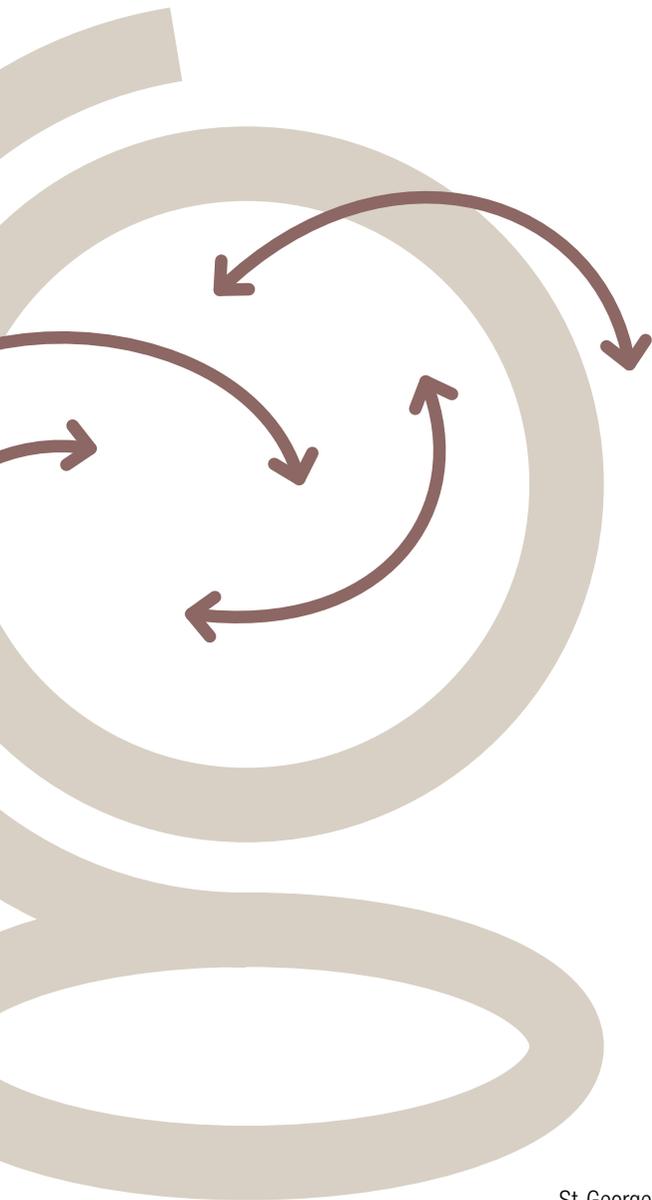


They want to turn shopping into an experience, which is why Karsten and Marcus Nüsken have converted their cooling units to EC technology

about that. Our newly designed supermarket is, for instance, the first in Europe with a fragrance delivery system. The specially designed scent comprising of lemon and pepper aromas makes a subliminal impression on our customers and provides a feeling of well-being. We achieved 88 from 100 points in a customer survey recently performed by infratest. The average is 68 points in Germany. This means we are one of the top ten supermarkets in Europe.

Where do you see further saving potentials for electricity?

Marcus Nüsken: The awareness for energy efficiency will continue to rise, I therefore believe that EC motors will become the standard. But heat recovery from refrigeration machines is also an important topic. Many produce hot water as they operate, that is a nice approach, but it is not enough at all. I believe that we will see hardly any refrigerated shelves in the long term. It is important to keep the cold inside the units. ○



JOB ROTATION

International “desk exchange” shows valuable competencies

Live in the world, and be at home in Germany. With 17 production sites and 57 sales offices in 50 countries, ebm-papst operates a diverse sales network with branches in many corners of the globe.

But the company's roots are deeply embedded in its South German native soil — in Mulfingen, St. Georgen and Landshut. As a global citizen originating from Germany, ebm-papst wants to become expert in the multifaceted aspects of global markets and also embed this global thinking in its parent company. The formula for this is called “Global Domestic”: ebm-papst is present in every country as a national company with primarily national employees. Customers will therefore always receive advice from familiar contact persons who, in turn, are closely networked to the employees in the German headquarters. Thomas Borst, Group Sales Managing Director, sees this as being the key to worldwide markets: “Business transactions are always based upon the personal interchange

between people”. And this applies equally for the communication and understanding between colleagues. For instance, Andreas Gerlinger the project engineer from Mulfingen and Alessandro Masotto the technical manager of the Italian subsidiary in Mozzate (Lombardy) exchanged their desks in the summer of 2007 so that they could familiarise themselves better with the work and environment of their colleague for ten months.

This German-Italian switch-over was initiated by Thomas Borst who gives his emphatic support to job rotation beyond national boundaries: “The proverbial look beyond one’s nose, understanding of foreign markets and customs is extremely helpful, in particular for our colleagues in sales.” In addition to cognitive competencies such as practical experience and background knowledge, Borst also places value upon intercultural management competencies such as communication skills, sensitivity and tolerance when dealing with foreign cultures. Options for foreign visits or a visit to the German headquarters are flexible and oriented upon individual situations. A stay in a foreign country for several months is not always necessary, some employees need only a four-week “introductory stay” to extend their personal horizon. ○

Going beyond the horizon: Job Rotation gives sensitivity for foreign cultures

“There is less moaning in Italy”

Andreas Gerlinger and Alessandro Masotto exchanged their desks for ten months and don't regret anything.

Where did you have your greatest difficulties at adjusting in the beginning?

Andreas Gerlinger: Everything went without problems, the Italian colleagues gave me their help and advice throughout the entire stay. I only actually had problems after work, with the traffic for instance...

Alessandro Masotto: I realised how important the language is. My proficiency in German was unfortunately not good enough at the beginning to do my job in the way I actually wanted to do it. But it improved every day.

What was your greatest impression during your stay in a foreign country? What were your best experiences?

Gerlinger: I was impressed by the great flexibility and the colleagues' attitude in the subsidiary, and that every type of customer problem is taken seriously. The customer is king in Mozzate, and customers also appreciate this.

Masotto: My contact to the colleagues in the Development Department was extremely interesting, I learnt a lot about the technology and the philosophy of our products. And the look at Production and how problems are dealt with there was also very instructive.

What do you consider to be the major difference between the work in Germany and in Italy?

Gerlinger: There is less moaning in Italy. The Italians are also very flexible and, contrary to a frequent prejudice, they are sometimes also considerably faster.

Masotto: The headquarters in Germany has of course very different tasks than the subsidiary in Italy. This also results in different methods and ways of thinking that I can now understand much better.

How did your way of working change during your stay in a foreign country?

Gerlinger: As I know the colleagues and work operations in the subsidiary, I can understand much better and do not have to ask further questions about small things. Also, I now tend to lift up the phone rather than send an e-mail. This is faster and therefore prevents many a misunderstanding.

Masotto: I have learnt very much about how ebm-papst thinks and acts, and I have a more detailed view upon the work operations and requirements in the German headquarters. This reduces friction when working together, and it is a great aid to me in providing even better service to my customers.



Andreas Gerlinger, 33, is the project engineer for Europe sales and has been with the company since January 2000



Alessandro Masotto, 38, is the technical manager of the Italian subsidiary and has been working at ebm-papst since 1996

The adaptive steering

Small motor, big difference: an innovative steering system on the new Audi A4 provides greater agility, steering with higher precision, better directional stability as well as significantly increased driving safety.

The magic word is dynamic steering. This new steering uses the vehicle speed to change the steering ratio and simultaneously adapt the steering torque. At high speed an indirect ratio and higher steering torque improves the directional stability. The dynamic steering is extremely accurate with its smooth-running especially when parking — only two turns of the steering wheel are needed from stop to stop.

Stability and dynamics The system utilises an interactive gearbox to supplement the power steering and the ESP. The gearbox absorbs manual impulses generated by the steering wheel as well as those from a high-dynamic EC motor. Drivers have a direct ratio at their disposal, they can control their vehicles with precision and react quickly: for example when parking, in city traffic or on winding roads in the low and medium speed ranges. The speed of the EC motor for moving the steering wheel is added in these situations, which means that drivers have to turn the steering wheel much less — a considerable increase in comfort and gain in agility.

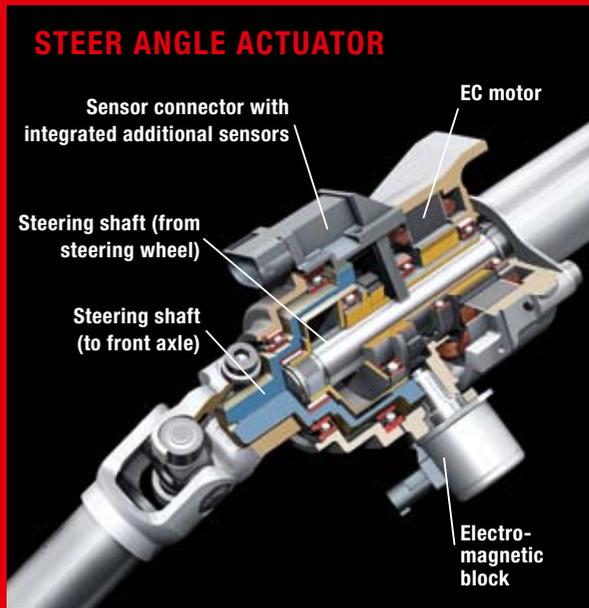
In critical situations at high speed, such as when oversteering after sharp evasive action, the dynamic steering can prevent the rear from swerving. When understeering — pushing the car to the outer edge of the curve — the dynamic steering also intervenes helpfully: it becomes more indirect for a short time and assists drivers with using the area in which the tyres still have good adhesion to the road surface. The steering also becomes more indirect at high speeds in which the steering angle is reduced by the angle

of rotation of the EC motor. The system checks several vehicle parameters so that the motor is operated in the correct direction — direct or indirect. The main parameters are the speed in addition to the steering angle. The dynamic steering works hand in hand with the ESP to provide stabilisation. The major advantage of this interplay lies in the fact that the ESP now acts on the dynamic steering rather than on the brakes according to situation. In an emergency the adaptive steering therefore quickly helps the vehicle to achieve a stable line — at the same speed. Drivers experience the stabilisation more harmoniously and more comfortably than without dynamic steering.

Quieter, smaller, more efficient In the differential steering systems currently known on the market, which were also developed by ebm-papst together with ZF Lenksysteme GmbH, the electric motor had to be designed to cope with high environmental influences. Its unprotected installation location in the engine compartment, in close proximity to the front axle, subjected it to dusty heat, perishing cold or dampness as well as aggressive fluids: from screenwash through brake fluid right up to battery acid. On the A4, though, the drive sits in the column directly behind the steering wheel as an integral component of the steering column. In this design, the steering shaft is routed right through the electric motor and therefore provides several advantages at the same time: it is protected from climatic influences and can be installed universally as opposed to previous solutions dependant upon the space available in the engine compartment.



Always in the right lane even at high speed: in critical situations the dynamic steering prevents the Audi A4 from swerving



The heart of the power steering

The mechanism of the dynamic steering system, the actuator, is integrated directly into the steering column. It consists of an EC motor with position sensors, an interactive gearbox and a lock to secure the motor into a motionless position. The Harmonic Drive gearbox ensures that both the manual pulses from the steering wheel and those from the EC motor are transmitted to the steering gear of the front axle. The interactive gearbox works almost clearance-free and with great efficiency. The motor itself, as a load-bearing element, is a component of the steering column, the steering axle passes axially through the motor.

The innovative trick opened up a whole series of new hurdles that the developers in St. Georgen, at ZF Lenksysteme and Audi had to tackle. The requirements changed due to the fact that the motor was moved into the passenger compartment. Of course it no longer had to be sealed, but it now had to be quieter, smaller and more efficient. The basis for development was therefore offered by a new EC motor design with a high power density optimised for the installation space. The brushless electric motor stood out from the outset through its low noise level at top working speed. Furthermore, it lasts throughout an entire vehicle life — and its energy efficiency is unrivalled. This innovative technology allowed drive integration in the steering column. It would not have been possible to have realised this system and the enormous power density with conventional electric motor systems.

The requirements constantly increased during the development phase. According to Thomas Schrag, sales support manager at ebm-papst St. Georgen, the initial motor was completely different than the one finally used. “We had very little

room available anyway, and because of the crash specifications the EC drive for the dynamic steering has now become very short — one millimetre less space and it would have had to be built very differently.” The solution worked out by the engineers can not only no longer be heard, it is also unnoticeable that a drive is working in the steering column. “The motor now has an absolute minimised detent torque, no torque ripple can be felt on the steering wheel, (torque fluctuations whilst the steering wheel is being turned and the electric motor is working). Our developers sat for months working on a solution to this problem”, recalls Schrag.

Despite the secret helper, the driver always has direct contact to the front wheels via the steering wheel, which is also a legal requirement. The driver always has full control, even in the unlikely event that the motor for the differential steering system should fail. The intelligent technology now puts every manoeuvre to the test wherever driver error was frequently the cause of accidents to date. This is how the system helps in achieving extra driving stability and comfort — and therefore greater joy at driving. ○

The developed integration solution can not be heard — and can not be felt

The energy

01 The household appliance industry invented so-called active drying so that the tea towel did not have to be used afterwards. However, up to now the luxury of cupboard-dry plates had to be paid for by additional energy consumption. The reason: in the rinse aid phase important for active drying, the temperature in the washing compartment has to be approximately 65 degrees. Rinse aids work optimally at this temperature and the dishes also need this temperature to dry. A new technology based upon “boiling stones” reduces the required drying temperature to around 30 degrees, this saves valuable energy and it even improves the drying result. Plastic bowls, which are difficult to dry, can now also go directly into the cupboard without having to be dried again by hand.

From the dishwasher into the cupboard, and without any manual drying at all.

CIRCUIT WITH STONE

04 At the start of the next washing cycle the first heating phase collects the water out of the zeolite and feeds it to the fresh dish water. This does not cause the energy used to be any higher, the dish water has to be heated at the start anyway. In total the savings potential lies at around 150 watt-hours per wash cycle. This is 15 percent less energy as compared to current systems with active drying. The saving results from the reduction of the last wash temperature from 65 to around 30 degrees. Further plus points: wash times are shorter, the kitchen remains steam-free and the tea towel has a holiday. And: the plastic bowls that caused problems up to now, such as Tupperware, comes out of the machine dry.

So-called ‘active drying’ makes this possible — and a stone now makes it even more effective.

The bill

The stone

02 The stone is called zeolite or “boiling stone”, but it could also be called “swallowing stone”. Its crystal structure is made up from a colossal network of micro channels. A single-family home with a large garden would have enough room on the surface spread out of a single gram. The approximately 1,000 square metre surface area per gram gives the stone colossal water absorption. Whoever wants to expel the stored liquid only needs to heat up the stone. The stone absorbs

the heat and vaporises the water into the channels.

When the dried stone absorbs new liquid it gives off this heat. Zeolite can therefore also be used as a buffer store for energy. This does not change the crystal structure with the channels, the process can be repeated over and over again.

03 The technology used

by the Bosch Siemens Hausgeräte Gruppe (BSH) to solve the tea

towel dilemma is based upon an intelligent circuit of water, heat and zeolite. And

it works like this: A special blower developed by ebm-papst Landshut

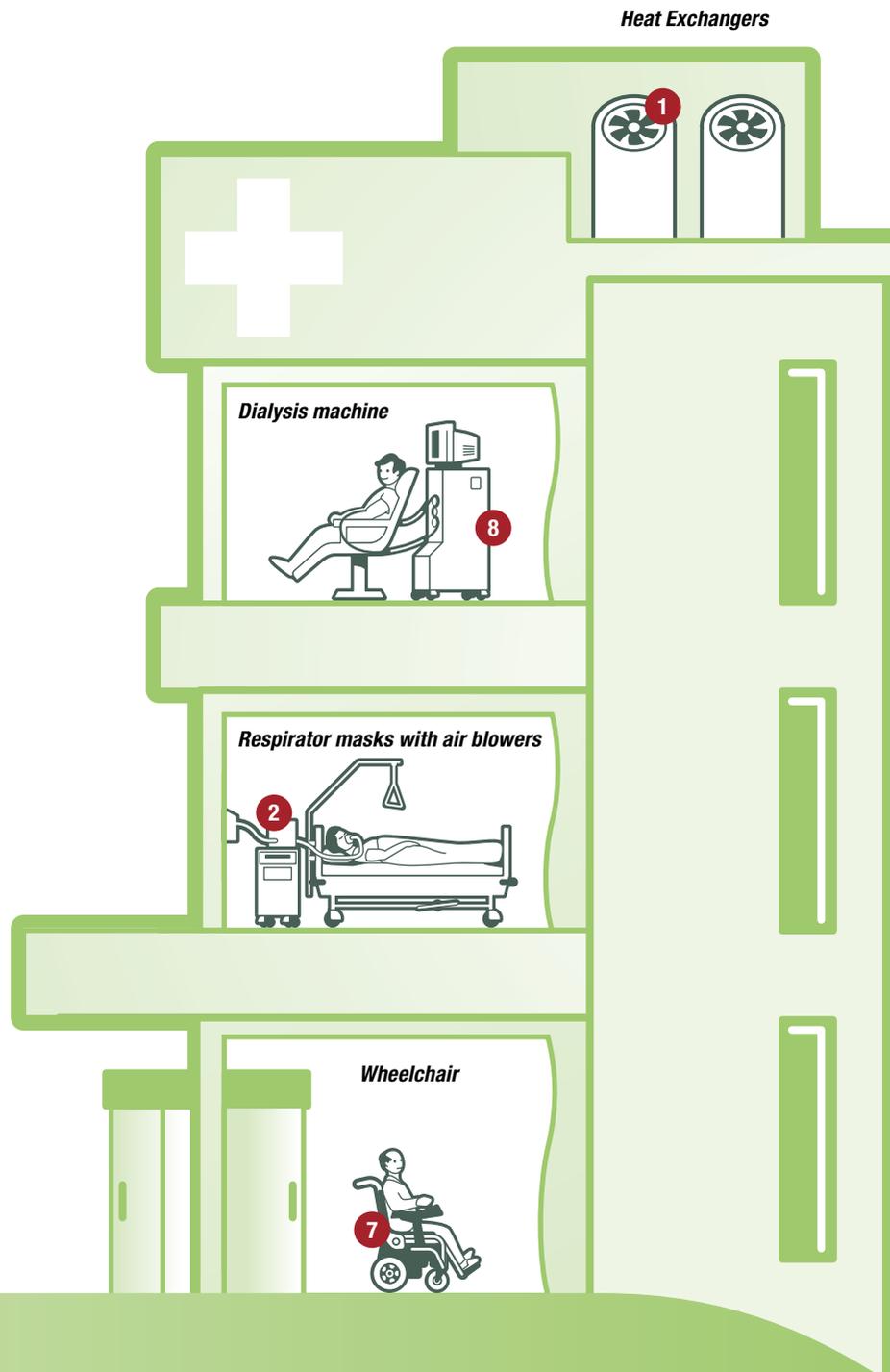
guides the warm humid air out of the washing compartment through small dry zeolite stones.

The stones extract the water out of the air, but immediately release the heat into the air. The warm dry air is now fed back into the washing compartment where it absorbs new humidity and flows back to the stones. The blower that keeps this circuit in motion needs energy to do this of course, but the second surge of heat to the drying temperature of 65 degrees needed for conventional dishwashers is dispensed with.

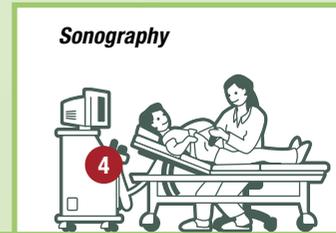
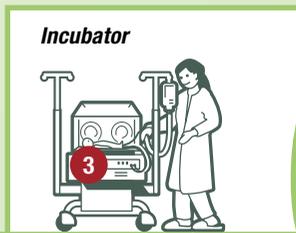
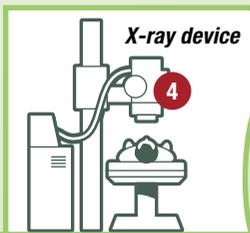
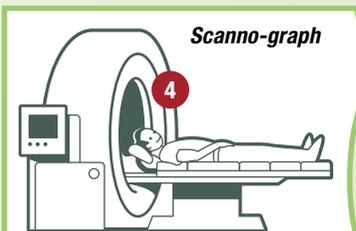
The circuit

The health system

EC fans and drives are invisible and indispensable helpers in hospitals. Fans on the roof **1** ensure perfect, noiseless air-conditioning in all rooms. In respiration devices **2** blowers ensure the supply of sleep apnoea patients. As mobile devices, the blowers are also used in ambulances and helicopters. In incubators **3** for newborn babies, EC technology guarantees maximum output constancy, vibration-free performance and reliability in all modes of operation. In sonography and X-ray devices, as well as in computer tomography **4** whisper-quiet EC fans cool the sensitive equipment — and the patients. The positioning of these devices, which are indispensable for diagnostics, is effected rapidly and precisely by EC drives. This applies also to the operating tables and chairs **5**, in which fine positioning and reproducible movements without vibration are essential. These qualities are too important for laboratory technology **6** and rehabilitation equipment **7**, for example rehabilitators for the retention of mobility after an operation. And also the pump drives of dialysis machines **8** build on the safe and efficient health system of ebm-papst products for medical technology. ○

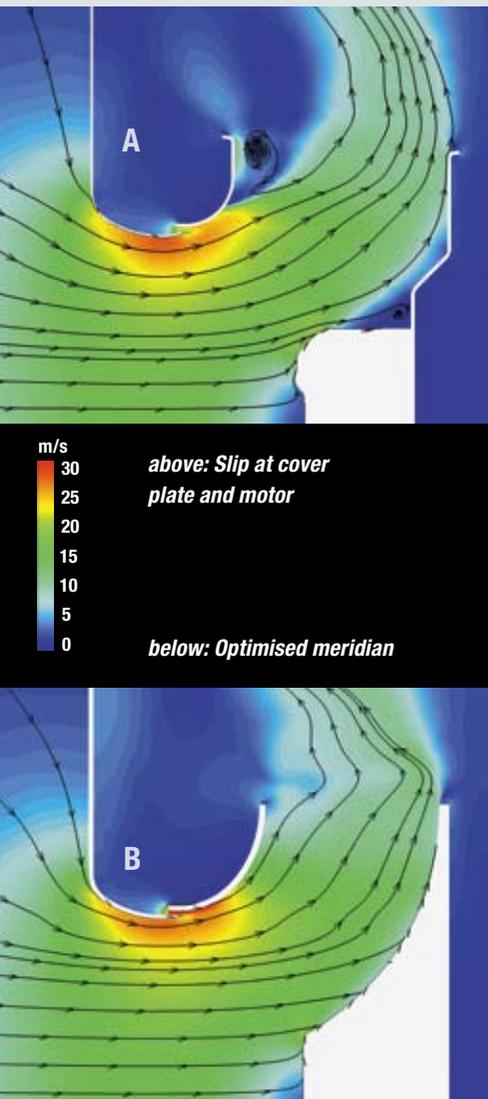


From the roof to the basement: EC drives and fans work unobtrusively but effectively in all areas of medical technology, making it faster, more reliable and quieter





**Dr. Jürgen Schöne, Manager,
Prototype and Function Development for
Aerodynamics, ebm-papst Mulfingen**



High level of accuracy

Simulation tools for aerodynamics

We are often asked whether, in view of the top-quality simulation tools, aerodynamic measurements are still necessary. Indeed, in the last 30 years there has been tremendous progress in the ability to predict flow phenomena. Whereas not too long ago it took days and weeks to calculate relatively simple, often more academic cases on extremely expensive supercomputers; thanks to the enormous improvement in the computing capacity of computers, huge progress in the development of computation algorithms and the continually increasing experience in the use of new tools, a completely new situation has arisen. Today, even the processors found in any PC are sufficient hardware. They are arranged to form so-called clusters (i.e. several processors combined in groups). This creates very powerful computers which, compared to the former age of the supercomputer, are very inexpensive and easy to use and whose operation is no great obstacle even for medium-sized companies.

Also with regard to computation procedures, there has been great progress, leading to an enormous improvement in the accuracy of computation results even with complex geometries and operating conditions. Meanwhile there are advanced commercial computation programs for various areas of application. Whereas initially aerodynamic simulations were carried out mainly for aeronautical engineering applications, today there is hardly an area of aerodynamics in which the most varied problems are not being examined with the use of simulation methods. With regard to our topic of air flow around fans,

air performance and efficiency are of particular interest, whereby local flow phenomena such as slip, vortex generation and uneven air flow reduce these variables, and should thus be avoided. The advantage of simulation compared with measurement thus lies primarily in the fact that the flow field around the blades makes the problems visible, so that they can be specifically eliminated. In Fig. A, the flow slips at the cover plate and motor, for which reason this impeller has rather low efficiency. By means of a more favourable arrangement of the flow channel, slip is prevented (Fig. B), air performance and efficiency are thus considerably improved.

This example shows that problems which, in the time before simulations tools, could only be worked on using many time-consuming measurements on the basis of 'trial and error', can today be resolved with great accuracy by means of simulation. However, since considerable simplifications are sometimes necessary for the calculation (especially for calculating turbulence), there may also be cases in which simulation does not provide satisfactory accuracy or for which a calculation is not expedient on account of the excessive computing effort. And hence the answer to the initially posed question, that today and also in future, aerodynamic measurements are and will remain indispensable. There will be a considerable shift to measurements serving

to check simulation results which are required for acceptance of the final data and with which physical variables are determined which are not (yet) accessible to a simulation, for example noise generated by aerodynamic processes. ○



Imprint

Publisher:

*ebm-papst Mulfingen
GmbH & Co. KG
Bachmühle 2
D-74673 Mulfingen
www.ebmpapst.com*

Responsible for content:

Thomas Borst

Editor-in-chief:

*Kai Halter,
+49 (0) 7938 / 81-532
mag@de.ebmpapst.com*

Project co-ordinator:

Katrin Lindner

Editorial staff:

*pr+co. gmbh
www.pcco.de*

Layout and

*production:
pr+co. gmbh
www.pcco.de*

Art direction:

Gernot Walter

Authors:

*Steffen Beck
Martin Reinhardt
Stefan Schanz
Dr. Jürgen Schöne
Monika Unkelbach*

Photography:

*Audi
Ralf Kreuels
Reinhard Rosendahl
Siemens
Vensys
Gernot Walter*

Illustration:

*Gernot Walter
www.rotwerk.net*

Reproduction and Print:

*Bertsch KG
Medienproduktion
www.bertsch-media.de*



mag
all about ebm-papst

Find us here: Trade fairs & dates

Trade fairs

- ISH**, Frankfurt, 10–14 March 2009
- Mir Klimata**, Moscow, 10–13 March 2009
- HARFKO 2009**, Seoul, (Koyang City) 18–21 March 2009
- Amper**, Prague, 31 March – 3 April 2009
- China Refrigeration (HVAC)**, Quanzhou, 5–7 April 2009
- Busworld**, Shanghai, 8–11 April 2009
- HMI**, Hanover, 20–24 April 2009
- Achema**, Frankfurt, 11–15 May 2009
- National manufacturing week**, Melbourne, 12–15 May 2009
- Energy Saving**, Minsk, 19–22 May 2009
- NEEP 2009**, New York, 27–28 May 2009
- Vehicle Dynamics Expo**, Stuttgart, 16–18 June 2009
- Intersolar**, San Francisco, 14–16 July 2009

Events

- Regional “Youth research” competition**, 5–7 March 2009
- 14. ebm-papst Marathon**, Niedernhall 13 September 2009

Technology for further reading

Are you interested in technical data, developments and products? The current issue of our sister publication tech.mag once again features a wide range of technical articles:

New EC centrifugal fans with backward curved blades: Saving energy with air-conditioning and ventilation systems // An intuitively usable software solution for PDA and smartphone: Control fans remotely now via Bluetooth // Modern technology enables a new approach to solutions in the automobile industry: LED headlights require special fans // Extremely quiet across the entire speed range: Energy-efficient EC fans for air/water heat pumps // For maximum “air purity”: First fan series with antibacterial action // Location-independent, ideal oxygen supply without adjustment effort: Centrifugal blower with mass flow sensor for exact air supply



tech.mag 1/2009 is available right now. Contact our sales team or e-mail Corinna.Schittenhelm@de.ebmpapst.com.

Little children, clever heads

The next generation must be nurtured from kindergarten onwards: if we want to ensure there are enough clever heads in the future we must make technology attractive right from the start.



Engineers of tomorrow discussing a project with Roland Weisser

Children are born explorers: Why does the wheel turn? How does a bulb light up? What happens to the sun at night? With various projects for small and not-so-small children, ebm-papst is satisfying the next generation's natural curiosity. At the St. Georgen location, the "Technolino" partnership programme initiated by the "Südwestmetall" association is quenching children's thirst for knowledge. "We teach children about technology in a playful way", explains Roland Weisser, ebm-papst plant manager at St. Georgen. Kindergarten children visit the factory and, together with trainees and the speaking bird puppet Technolino, discover the world of technology. For example, fan-driven mini-cars are made, with which the little researchers can then hold races. "Clever heads are our most important resource", emphasises Weisser, "so we must make sure that this resource continues to flow in the future, too."

The Mulfingen location is also actively committed to the early promotion of the next generation, for example in several projects in the innovative Kocher & Jagst region. Every year since 2004, around 20 children aged between eight and ten have spent a week tinkering around in the training workshop. Together with two committed retired employees, as well as trainees and trainers from ebm-papst, they have been doing the "Inventors week" credit; for example, little hovercraft and gliders have been developed, designed and constructed. In cooperation with schools in the region, ebm-papst is taking part in the MINTecHohenlohe project sponsored by the Landesstiftung Baden-Württemberg (state foundation). In the MINTec workshops, trainees are the learning partners of the schoolchildren. The topics go beyond the compulsory syllabus and encourage research into and discussion of

physical and scientific phenomena. At the end of a week in the workshop, the children have learnt a lot about technology and can proudly take their own "journeyman pieces" home. "The schoolchildren have a lot of fun with this form of learning, for the young trainees can give them the assistance they need", explains Stefanie Geisbusch, the Project Manager for MINTecHohenlohe. This early contact and exchange of practical experience with the trainees frequently leads to the subsequent desire to take up a technical occupation. The students at Heilbronn Technical College took this decision long ago, but they still benefit from sponsorship by ebm-papst in the form of two foundation professorships. One of the professorships is in the area of renewable energies. Here the focus is on the next generation in the truest sense of the term. ○



Technology can be fun: development, design and construction under professional guidance



“



*Adriana Belmiro da Silva (36),
General Director
ebm-papst Brazil
Phone: + 55 11 41 38 50
adriana.silva@br.ebmpapst.com*

For me, it is a great satisfaction to see that the new structure of ebm-papst Brazil is modern, well located and represents accurately the parent company in Germany. Here in the city of Cotia in São Paulo State we are in the heart of Brazil. In this state the largest part of the commercial and industrial complex is focused and it is a distribution centre for the whole country. Cotia was chosen because of its easy access to one of the main thruways of the country, which enhances our logistics and improves our services. In the past three years we managed to increase the market share and brand awareness — not only in Brazil, but in the whole of Latin America. For me as a woman in this leading position my work is an ongoing battle because the expectations and requirements are twice as high as they are for a man. But it makes me proud to have achieved this point in my career and it is a challenge for me and my team to increase the success of the company. Now our main goal is to triple sales by 2015. Brazilian people are networking people and we love to keep a strong and close relationship with our customers. As you can see, Brazil is much more than just soccer.

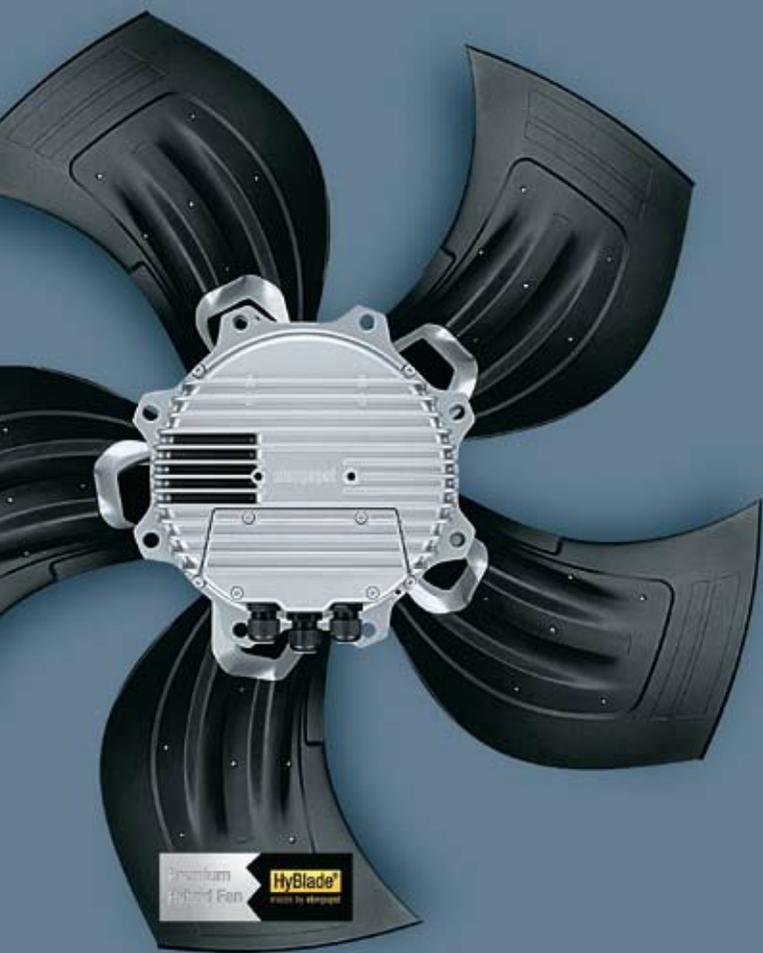
”

”

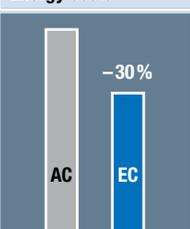


Switch on.

Switch off.



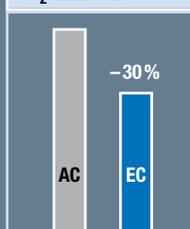
Energy costs*



* Detailed calculations on our website

- conventional technology
- ebm-papst EC technology

CO₂-Emission*



The calculation is impressive: If, for ventilation, refrigeration and air-conditioning, the European industry were to switch to so-called EC fans, like the latest generation made by ebm-papst, the environment could be saved a lot of trouble. For state-of-the-art EC technology, already surpassing the tough EFF1-directive, makes for a reduction in energy costs by about 30% - thus turning 4 coal-fired power plants redundant! At the same time, CO₂ emission could be reduced by about 16 million tons each year. Equally impressive: switching from conventional to this new technology is really quite simple. Interested in getting more information?

Simply go to: www.eco.ebmpapst.com



The engineer's choice

ebmpapst