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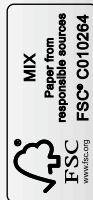
# Cellar parties with clean air

How Lukas Pfänder gives viruses  
no chance with a retrofit.

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**mag**





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The FanDrive DV280

Dear readers,

Energy, and how we use it, are hot topics these days. Our company plays its part in lowering energy consumption on several levels. Our products naturally do this in our customers' applications, but we as a company are also doing our bit.

Old fans with unregulated motors are often still in use in our customers' applications. Our highly efficient fans—such as the latest RadiPac generation or AxiEco—can significantly reduce energy consumption here. However, when these products are also combined with IoT solutions, the use of the fan can be optimized even further. Our cover story about the retrofitted ventilation system in Beutelsbach focuses on precisely this advantageous combination of product and smart control system.

Working hand in hand with our customers, we want to use intelligently controlled, highly efficient EC fans to minimize CO<sub>2</sub> emissions all over the world. To achieve this goal as a company, we are also taking a more regional approach. In the Americas, Asia-Pacific, and Europe, we will make our development and production capacity stronger and more autonomous so that we can get closer to our customers locally and improve our delivery performance.


This regional approach also helps us to work more sustainably as many delivery routes will no longer be required. We warmly invite you to join us as we strive to achieve this important goal!

Thomas Nürnberger

MANAGING DIRECTOR  
SALES AND MARKETING  
EBM-PAPST GROUP







In Iceland, the Swiss company Climeworks operates the world's most powerful CO<sub>2</sub> SUCTION UNIT. Appropriately, it bears the name "Orca", which stands for power, strength and energy in Icelandic. In the system, axial fans from ebm-papst draw ambient air through a CO<sub>2</sub> filter. When the filter is saturated, the carbon dioxide is removed at 100 degrees Celsius and pressed into the ground. Orca draws the energy required in a climate-friendly way from a neighboring geothermal power station.

Read the whole story at [mag.ebmpapst.com/orca](https://mag.ebmpapst.com/orca)





The InMotion student racing team from Eindhoven is working on the **FUTURE OF MOTOR SPORT**: the electric sports car. The “Revolution” not only impresses with its speed but also with faster charging times: It is currently charged in 12 minutes, and even faster in the future. In this way, the team wants to make electric cars more popular and excite the fans at the race tracks. ebm-papst is supporting the project with its expertise: AxiEco fans keep the battery pack cool. *Read the whole story at [mag.ebmpapst.com/inmotion](http://mag.ebmpapst.com/inmotion)*





## Plug-and-play isolation station

The Biofactory, Singapore's leading innovation hub for high-quality biomedical technology, has developed a portable isolation room. The innovative "System of Portable Anteroom for Containment" (SPARCX) converts any room into an isolation station. This means that in hospitals, for example, extra capacity to supplement the in-patient units can be created quickly and with no renovation work required. The driving force behind the innovation was the coronavirus pan-

demic, when health facilities hit their capacity limits for infection control. Thanks to a patented air purification solution, SPARCX achieves 99.9 percent decontamination. For the SPARCX ventilation system, The Biofactory focused on high-quality components that are compact and easy to install, which is why EC centrifugal fans from the RadiCal range of ebm-papst were chosen. ●

Read the whole story at:  
[mag.ebmpapst.com/biofactory](http://mag.ebmpapst.com/biofactory)



## »Innovation is the key to success«

In spite of global crises, ebm-papst continues to invest heavily in research and development. Dr. Stephan Arnold, CTO at ebm-papst, explains the reasons for this — and what customers gain from it.

*Mr. Arnold, ebm-papst will be investing EUR 130 million in research and development in the current fiscal year. What's the idea behind this major investment?*

We are constantly thinking ahead here. Right now, we are developing the products that will be launched on the market in three years—and we still want to be ahead of the competition in ten years. After all, we take our role as a technology leader seriously. And this despite the fact that the world is turning ever faster and customers—rightly—expect our products to keep up with it. Innovation is the key to success, especially in uncertain times.

*In what specific measures is this investment evident?*

A new electronics development center is under construction in Muldingen. That means 5,000 additional square meters for the research and development of intelligent fan solutions. We have also completed a new qualification and testing center there. And we are expanding our development capacities in Asia and the USA.

*Is there a particular area at which the expansion of R&D is aimed?*

We are investing primarily in our core expertise—ventilation technology and aero-



Dr. Stephan Arnold is Managing Director of R&D and Purchasing at the ebm-papst Group

dynamics. We want to take the next steps toward the future and move faster from an efficient to an intelligent fan. Digitalization enables us to take the efficiency of our fans to the next level with demand-based, intelligent operation. It also contributes to a central goal of these investments: to make more efficient use of resources across our entire product portfolio.

*Can you give specific examples of what your customers can expect from ebm-papst here?*

We are continuing to develop our modular systems and therefore ensure faster service and better supply reliability. These are key issues that a task force has been driving forward since last year. With our solutions, we also want to provide optimal support for

our customers' digitalization efforts. It's not about digitalization as an end in itself, it's about bringing customers more concrete benefits with digital services and smarter, more efficient products.

*You have already mentioned Asia and the USA. Will there be a regional focus for the company's investments?*

We can see that the markets in Europe, Asia, and America will continue to diverge, for they have different requirements and potential. As a global partner for our customers, we have been taking this into account for a long time now through our "local for local" strategy. Now, as a company, we are taking a more regional approach and giving local units the development and production power they need for this. ●



# The air bodyguards

Event spaces experience two extremes: they are either unused or packed with people. The ventilation system in the event location Stiftskeller in Beutelsbach could no longer cope with the changing requirements: after a retrofit, it not only circulates air more efficiently but is also vigilant about the air quality using sensors.

COMPANY  
Pfänder GmbH

LOCATION  
Rot am See, Germany

Fans and sensors  
belong together.  
Lukas Pfänder and  
Ralf Braun are  
convinced of this.



**“We take care  
of when and  
where you need  
ventilation,  
heating or cooling.”**

LUKAS PFÄNDER  
—  
MANAGING DIRECTOR  
PFÄNDER GMBH

**B**

Beutelsbach in the magnificent vicinity of Stuttgart. The monastery is located in the old city center, adorned with timber framing. Among other things, a gym, a community cinema and an event location in the old monastery cellar have been set up. A single ventilation system supplies the rooms with air, using a lot of electricity in the process.

A planning office commissioned by the city turned to the company Pfänder, which mainly automates buildings. “We do not build ventilation or heating systems ourselves, but rather take care of their control system, programming for example when and where ventilation, heating or cooling is required,” says Lukas Pfänder. Many customers come to Lukas and his brother Tobias Pfänder with old ventilation systems that consume too much electricity. A new control system does not always suffice, but completely replacing the systems is expensive and time-consuming. When looking for a partner for difficult modernization projects, the two brothers were aware of the retrofit projects of the ebm-papst Service Center Breuell & Hilgenfeldt.

Since then, they have been implementing these types of upgrades in collaboration with the fan manufacturer from Muldingen and retrofit expert Dieter Hildebrandt from Breuell & Hilgenfeldt.

#### *Old system, new control?*

For the Beutelsbach Stiftskeller, the task was to only modernize the ventilation system’s control system. “We took a look at the control cabinet on site. It was still in good condition. But we were taken aback when we looked at the ventilation: old belt-driven fans were still installed.” A new control system for an old system? As a result, the greatest potential for savings would be unused. Dieter Hildebrandt’s suggestion: eight new RadiFit centrifugal fans in four systems that supply fresh air to the vaulted cellar, gym, showers, changing rooms, and cinema much more efficiently. The ventilation shafts in a good condition and the limited space in the cellar were perfect conditions for a retrofit: System open, old fans out, RadiFit in. →



The system’s control cabinet was still in good condition. It was modernized, including a new control and an ebm-papst neo gateway. Instead of the old belt-driven fans, eight new RadiFit centrifugal fans now provide fresh air.







The vaulted cellar, which is used for events, is located deep below the old monastery. It is important that the cellar air is not stuffy.

**“Our aim was to reduce the ventilation system’s energy consumption by at least 60 percent.”**

LUKAS PFÄNDER — MANAGING DIRECTOR PFÄNDER GMBH

*Saving energy, sixty percent and more*

They then went to look at the electrics in the control cabinet. The Pfänders read the new ventilation system’s performance values for the first time: “Our aim was at least 60 percent less current consumption. This permits infinitely variable regulation of the RadiFit EC motor. Instead of two stages that correspond to a power of 0 or 100 percent, we can now call up outputs of 16, 37, or 89 percent as required.” The 60 percent savings target was already achieved by replacing the fans, but there was still room for improvement.

This is because there is even more efficiency to be had if the demand is precisely identified and automatically controlled. The rooms of the Stifts-

keller are perfectly suited to this, as Lukas Pfänder explains: “The gym is not used for half of the day. However, if there is a lesson being taught there, the CO<sub>2</sub> content increases sharply and, therefore, the demand for fresh air rises significantly too. After the lesson, the showers and changing rooms are used, causing high temperatures and humidity.” With demand-based control, the ventilation system reacts independently to these rapidly changing requirements. The replaced control cabinet already offered the right conditions for this. All that was missing was sensors and gateways. Dieter Hildebrandt recognized the opportunity and presented Lukas and Tobias Pfänder with gateways from the start-up ebm-papst neo, which deals with intelligent solutions for data-based buildings. →



**NEXT-LEVEL AIR QUALITY**

With the Multi-IAQ sensor from ebm-papst neo, there is a simple and efficient way of ensuring consistently high air quality in event rooms. The sensor measures a total of five values, namely temperature, humidity, VOC (volatile, organic compounds that are harmful to health), CO<sub>2</sub>, and fine dust in the air. The viral index is calculated using the five measured values and a complex mathematical equation. This indicates the quality of the air and the risk of virus transmission and can be read off from the freely accessible IAQ Connect app. The multi-IAQ sensor can be installed in flush-mounted sockets similar to a light switch.





CO<sub>2</sub> content, humidity and temperature are measured in the gym and the changing rooms. The system regulates the supply of fresh air accordingly.

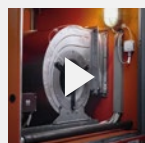
**“We have perfectly tailored the control system to the requirements of the monastery cellar to save even more energy.”**

LUKAS PFÄNDER — MANAGING DIRECTOR PFÄNDER GMBH

#### *Sensors make it smart*

The sensors continuously measure CO<sub>2</sub> content, humidity, temperature, and fine dust concentration in the air. The values are sent to the Intelligate Air Gateway, which forwards it to the ventilation system control system. The control system has been individually adapted and programmed for the Stiftskeller. If the CO<sub>2</sub> value in the vaulted cellar—or the humidity in the shower—exceeds a certain limit value, the system automatically adjusts up and back down once the air quality is good and, thanks to the EC motor, this is done smoothly and efficiently. Ralf Braun,

Sales Director for Germany at ebm-papst, explains: “Of course, you can also adjust it manually. However, the interaction between the sensors and the system is very reliable and, above all, economical.” Individual functions, such as sending a warning to the building’s caretaker by e-mail, are also possible if a certain value is exceeded. “This ensures a very high air quality on an ongoing basis. After the last few years and especially at larger events, that is a good feeling,” says Braun. Therefore, visitors to the monastery cellar can feel completely at ease. Thanks to the retrofit, in addition to efficient ventilation, the quality of the air is ensured at all times. ●



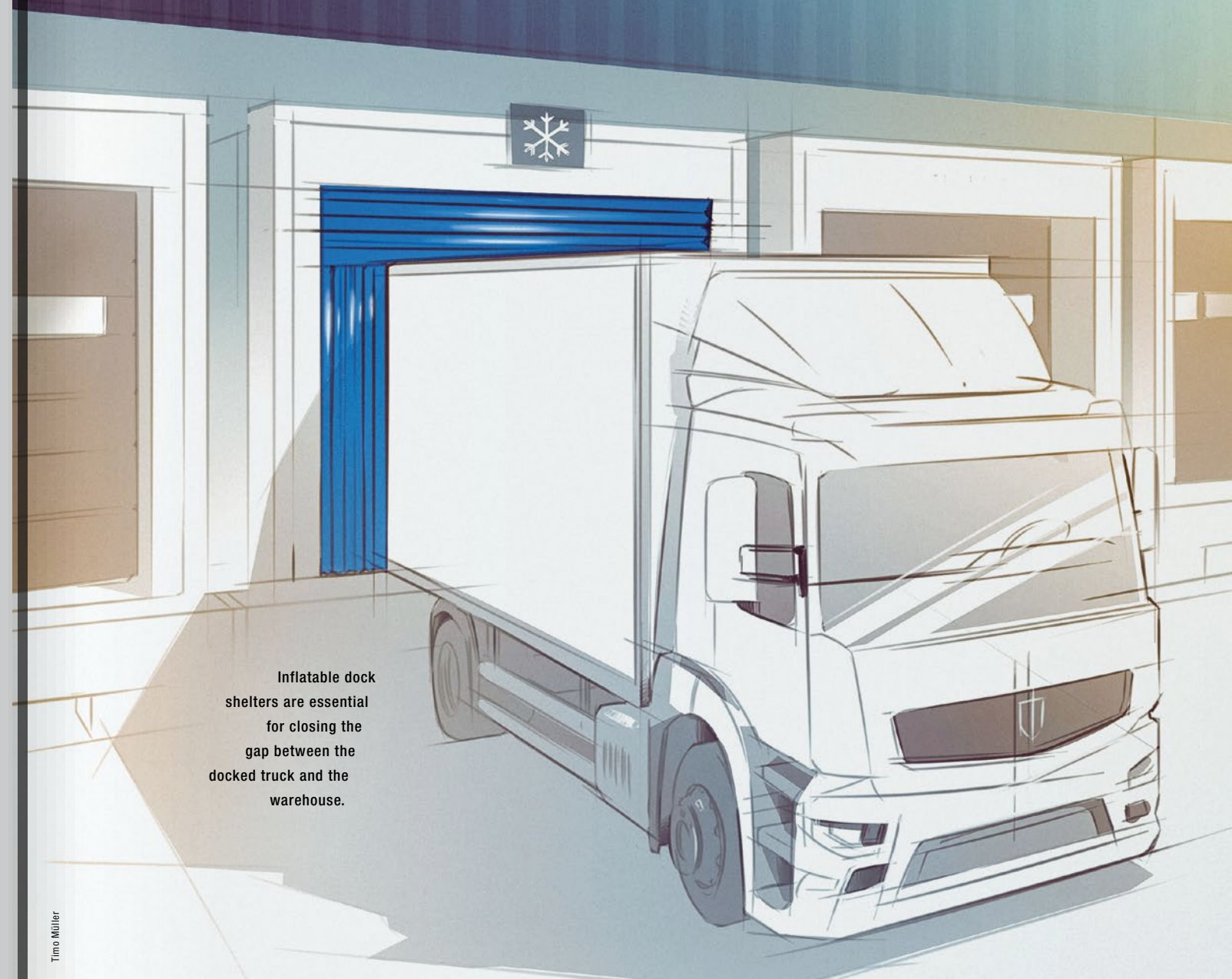
WATCH THE VIDEO OF THE PROJECT:  
[mag.ebmpapst.com/beutelsbach](http://mag.ebmpapst.com/beutelsbach)

COMPANY  
Van Wijk Nederland BV

LOCATION  
Lelystad, The Netherlands

# Quite inflated

When trucks are loaded and unloaded, inflatable dock shelters close the gap between the vehicle and the loading ramp. Until now, this has involved fans blowing at full power the entire time—with a lot of energy lost in the process. Dutch company Van Wijk has a better idea.



Inflatable dock shelters are essential for closing the gap between the docked truck and the warehouse.



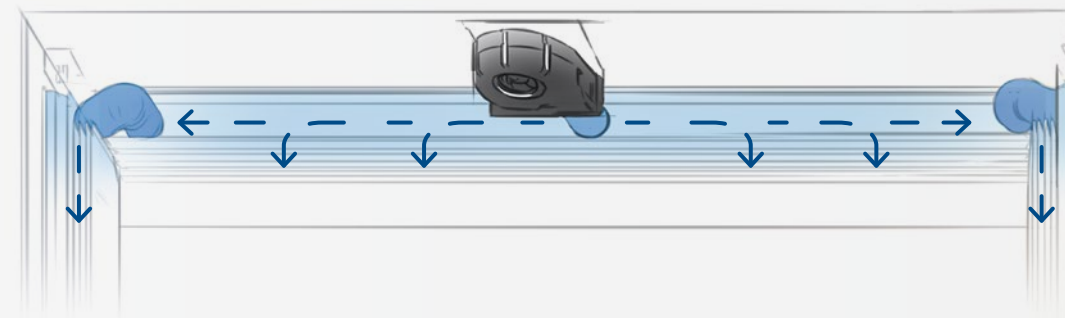
Inflatable dock shelters are important for logistics companies. They close the gap between the docked truck and the warehouse, protecting the building interior from external environmental influences. Drafts, rain and wind, as well as insects and dust, stay outside. The desired interior temperature remains stable with neither heat nor cold escaping. Sealing

off warehouses is fundamental, especially in sensitive areas such as the food industry. The inflatable dock shelter is activated at the push of a button. A fan fills cushions mounted at the top and sides with air within 20 seconds. The air pressure must remain constant during loading and unloading so that the cushions reliably seal the space between the dock and the truck.



In supermarkets, online shipping facilities, and distribution centers, dock shelters effectively—and now, thanks to RadiCal, also efficiently—protect against weather and temperature fluctuations.

The RadiCal in a scroll housing was the perfect choice to create an energy-efficient solution.



This used to consume a lot of energy, especially when the loading process took longer. Erik Stoffer, Sourcing Manager at Dutch company Van Wijk, knows the problem. “The fan worked at full power during the entire loading process. Even when the cushions were completely inflated. It was really unnecessary.”

Van Wijk is one of Europe’s leading manufacturers of dock levelers and dock shelters. The company manufactures and sells them under the brand name “Loading Systems.” Its customers are spread all over the world and include supermar-

able dock shelters: the RadiCal EC centrifugal fan in scroll housing. The fan was actually designed for residential ventilation, but ebm-papst recognized its potential to shine in other areas as well, as Archibald Bakker, sales engineer at ebm-papst Benelux, explains: “Since Van Wijk was looking for an energy-efficient solution for inflatable dock shelters, the RadiCal in scroll housing was a perfect fit.”

A vane anemometer is positioned in the fan’s scroll housing. This sensor measures the actual air flow and transmits the data to the fan’s integrated control electronics. The control electronics adjust the speed of the EC motor to the desired setpoint value, thus regulating the air volume. Erik Stoffer is enthusiastic about the new solution: “The fan shuts down the power as soon as the cushions are completely filled with air. The pressure in the cushions remains constant during the loading process even though the power is low.” The result: a 35 percent reduction in the application’s energy consumption. This not only reduces operating costs, but also protects the environment.

#### *Onwards and upwards*

But that’s not all. The inflatable dock shelters are set to become even more environmentally friendly in the future. Van Wijk sees a need to optimize the cushions, which are constructed from sturdy, wear-resistant PVC, by making them thinner. The advantages are obvious: “Thinner material means lower material consumption. This not only saves production costs, but is also more environmentally friendly,” says Stoffer. “We will then be leading the way not only in reducing our energy, but also our material consumption.” ●

**“The fan shuts down the power as soon as the cushions are filled. The pressure remains constant.”**

ERIK STOFFER — SOURCING MANAGER AT VAN WIJK

ket chains, furniture manufacturers, online shipping giants, and other large distribution centers. To meet its own quality standards, Van Wijk was looking for a partner to find a more energy-efficient solution for the inflatable dock shelters.

#### *A fan on an energy-saving mission*

That’s how the partnership with ebm-papst came about. They had just the right fan for the inflat-



# Range hoods in a smart design

Pando focuses on quality and state-of-the-art technology for its range hoods. That is why the Spanish manufacturer relies on the new ebm-papst RadiFlex.

For over 40 years, Pando has been developing and producing range hoods in Argentona, a small town outside the gates of Barcelona, in almost all types and varieties: from the classic built-in hood to island hoods and downdraft extractors. Most hoods go to Spain and Portugal, but Pando also serves customers around the world. The promise is the same everywhere: top-quality products.

These days, range hoods are much more than useful kitchen helpers that free the home from unwelcome cooking odors. They are design objects and increasingly offer smart functions. "Our aim is to increase the quality of life in the kitchen," says Rafael Freire, Marketing Manager at Pando.

Pando can only meet this promise by using high-quality components. The blower is key here: it generates the necessary suction pressure to dissipate the kitchen fumes. It needs to be as quiet as possible and consume little energy, which is becoming more important. When it comes to the blowers, that's why the Spanish hood experts have been relying on EC solutions from ebm-papst for the past 15 years.

With the RadiFlex, ebm-papst has developed a highly efficient, high-performance blower that can be flexibly integrated into a wide range of hood designs. The overall result convinced Pando: the air flow and pressure are significantly higher with lower energy consumption, the noise emission is lower and the energy classification is outstanding. Now Pando is already working on integrating the RadiFlex into other models in their product range. ●

COMPANY  
**Pando**

LOCATION  
**Argentona, Spain**



With its range hoods, Pando wants to improve the quality of life in the kitchen and promises customers first-class quality. This fits perfectly with the ambition that ebm-papst is pursuing with "Engineering a better life."



READ THE WHOLE STORY AT:  
[mag.ebmpapst.com/pando](http://mag.ebmpapst.com/pando)



COMPANY

Cordenka GmbH &amp; Co. KG

LOCATION

Obernburg am Main, Germany



# A traditional company with state-of-the-art ventilation

W

When the maintenance staff for the air conditioning at the site dropped by at the old supply fan as part of their routine checks, they were astonished: the massive fan, with a diameter of over two meters, was damaged beyond repair. This was caused by vibrations that broke the conveyor blades, so the approximately thirty-year-old fan had finally been killed off.

This was not discovered immediately. “The system ventilates a relatively small manufacturing area as well as halls currently used as a ware-

house. During routine checks, we asked ourselves why it was so quiet, then we saw it: blade breakage, total damage that caused it to disassemble itself,” explains Jens Goßmann, responsible for process optimization at Cordenka.

*Strict requirements,  
high-quality replacements*

The company, which is headquartered in Obernburg am Main, has been producing technical vis-



At some point, a huge belt-driven fan comes to the end of its life cycle. At fiber manufacturer Cordenka, an air intake system fan, measuring over two meters, gave up the ghost. It was installed in a small space behind a narrow service door. The right replacement was required and now offers major advantages.

cous fibers since the factory was founded in 1924 and is now the leading manufacturer of technical rayon thread, which is predominantly used for car tires. For this reason, it is a matter of course that all machines, which are operated by around 600 employees, are of an outstanding quality. A high-quality, long-term reliable replacement was therefore required for the defective fan. Since Cordenka had already worked with ebm-papst, Goßmann approached the company directly and was referred to HDS GmbH, who took care of the

planning process as a service partner of ebm-papst. Everyone started working together.

A hundred-year-old factory building, a large axial fan, a small service door: “The fan could not be replaced like-for-like without laborious building measures. We had to disassemble it into individual parts to get it out in the first place.” That is why Goßmann and HDS also planned for the tiny door when organizing the replacement—and decided on a fan wall. “With a modular design, you can create the same performance and also

To make sure everything runs smoothly on the big site, service personnel make inspection rounds at regular intervals. The use of remote maintenance for smart systems makes this work that bit easier.



have greater flexibility: many old fans are located in small cellars, in which they are often built into a wall,” explains Jens Gerner, who led the project at HDS together with his colleague Jens Martin. 100,000 cubic meters of air flow per hour: this maximum power had to be reproduced using the RadiPac series’ EC centrifugal fans. “An average, run-of-the-mill fan cannot achieve that.”

#### *From axial to centrifugal*

Therefore, HDS planned the FanGrid with eight RadiPacs and supplied them in a modular system as individual modules and pre-assembled. From this point on, Cordenka’s service providers took care of assembly and connection. “The HDS concept was very good and the installation went smoothly,” says Goßmann. The new modules have been in operation for four months and run smoothly. And that is not all: they are infinitely adjustable.

“The old belt-driven axial fan could only be switched ‘on’ or ‘off’. We had already closed ventilation ducts that were not required in the warehouse in some cases, so that energy does not literally van-

## “The new fans will enable intelligent control and thus even more efficient operation.”

JENS GOßMANN

PROCESS OPTIMIZATION  
AT CORDENKA GMBH & CO. KG

ish into thin air.” says Goßmann. Cordenka can now also regulate the air flow into the supplied manufacturing facility because of the fans’ control characteristics, which actively saves energy. If production begins again in the warehouse at a later

At some point everyone gives up: since the 30-year-old fan could no longer withstand the vibrations of the drive, which was not operating smoothly, even the blades broke.



The HDS employees are satisfied. The fan wall was pre-assembled and tested at the factory and runs perfectly!

The FanGrid with eight RadiPac EC centrifugal fans, which was planned by HDS, makes perfect use of the tight space thanks to a tailor-made design and supplies the associated halls with a maximum air flow of 100,000 m³/h with a maximum electrical total power of 19kW.



time, the ventilation ducts will be opened again and the fans will be adjusted appropriately. And if, contrary to expectations, a fan has a problem in the future, seven more fans will effortlessly pick up the slack until it is repaired. At present, Cordenka is already testing how air quality can be improved using the fan wall.

For the successful project, Cordenka was awarded BAFA Module 1 funding for using efficient cross-section technologies. In the future, further retrofits with EC centrifugal fans are expected, explains Goßmann. “These have the advantage that they can be easily accommodated in relatively small rooms and can be integrated into intelligent control systems. This enables us to use them according to requirements and in a way that is more energy-efficient.” ●



With satisfaction  
Xiaofeng Wu looks  
inside a home  
boiler containing  
ebm-papst  
technology.



In China, the market for gas boilers is growing significantly at the moment. One of the largest boiler manufacturers and a pioneer in development is Guangdong Hause Thermal Energy Equipment Co., Ltd. The company, based in Huangpu, employs 226 people and has a production capacity of around 300,000 boilers per year. Among them are appliances for both residential and commercial customers. “We are a high-tech company that combines the manufacture, sale, and installation

of residential and commercial heating equipment and intelligent control systems under one roof,” is how Xiaofeng Wu, General Manager at Hause, describes the company.

For high-quality products, you have to start with the suppliers, says Wu: “After all, with the components from our suppliers we’re already buying in advanced technologies.” This profitable business relationship was abruptly shaken in the spring of 2020. When the pandemic struck and, in addition to the movement of people, the

movement of goods to China became subject to increasingly strict rules, Hause faced problems: The Italian manufacturer of a gas blower used in Hause boilers was no longer able to deliver on time.

*“Local for local” saves the day*

But why go far afield, thought Hause—and looked around on the domestic market. That’s where they found ebm-papst. “We

Mengxing Chen

COMPANY

Guangdong Hause Thermal  
Energy Equipment Co., Ltd.

LOCATION

Guangdong Province,  
China

# A systematic solution

In the middle of the pandemic, Chinese company Hause had problems obtaining important components for its boilers. German-Chinese collaboration helped in this emergency.

wanted a world-renowned manufacturing company, an industry champion,” says Wu. ebm-papst has had a presence in China with a headquarter in Shanghai since 1996, which is where the inquiry from Hause ended up. “We were invited to a meeting about Hause’s requirements,” recalls Jie Jiang, Market Manager at ebm-papst China. For a long time, ebm-papst has been pursuing the “local for local” idea in China, in other words, producing locally for the Chinese market.





Hause produces about 300,000 boilers annually in 50,000 square meters of manufacturing space. “Our aim is to set the agenda in the field of wall-mounted smart boilers,” says General Manager Wu.



Mengxing Chen



“We wanted a world-renowned manufacturing company, an industry champion.”

XIAOFENG WU  
—  
GENERAL MANAGER HAUSE

Hause was initially only interested in a gas blower. “During our discussions, however, we convinced Hause that a system solution would make more sense,” Jiang recalls. In the meantime, another supplier had also experienced delivery problems—and Hause commissioned the system solution. “Up to that point, we had relied on different suppliers for the gas blower, the venturi, and the valve. China’s vast territory and complex climate were the reasons for this; in addition, the gas quality varied greatly in some cases. Accordingly, we had to design the boilers individually. But the system solution from ebm-papst was ultimately able to guarantee us security of supply, premium quality, and an improvement in our products,” says Xiaofeng Wu, summarizing the decision process.

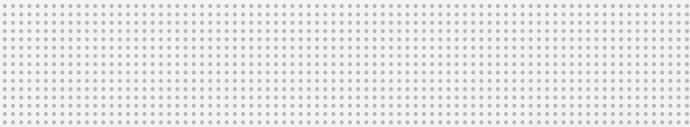
*First system solution for ebm-papst in China*

“We already supplied Hause in the past with individual components, such as blowers,” says Key Account Manager Alexander Remmele at the German site of Landshut, who has already visited Hause in China twice himself. The order for a system solution for domestic boilers sold under the brand name Boroa was a huge delight for him and his colleagues. “This is the first time we have supplied a system solution for a Chinese customer,” says Remmele.

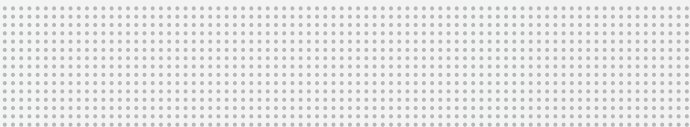
But first, some initial tests were necessary. Hause provided ebm-papst with a sample boiler, on which measurements were then taken. Initially, there was some noise generation, which Hause did not want, because after all, the boilers would later be installed in private households. Now international collaboration was required on the part of ebm-papst: “There was a close exchange between us and our Chinese colleagues,” Remmele recounts. Together, they discovered that the installed venturi was responsible for the noise, and its design was then optimized. “We changed the overlap of the venturi with the diffuser integrated in the housing,” says Remmele. Ultimately, Hause discarded this first variant again because the company wanted to build a narrower unit by changing the installed heat exchanger. “We provided support in this respect too, and together we found a solution to meet the high modulation requirements.”

*“Collaboration Plus” now and in the future*

Hause was impressed with the solution that had been found and signed a supply contract in March 2022. “By choosing the fully premixed condensing system solution from ebm-papst, we can guarantee consistently high product quality for our boilers,” says Hause General Manager Wu with satisfaction. The system solution can handle a wide range of gas qualities and always ensures optimum combustion. There is now a “Collaboration Plus” with ebm-papst, as Wu puts it. “By strengthening this, we will not only enjoy greater economic benefits, but will surely also advance the industry,” he says with conviction. ●



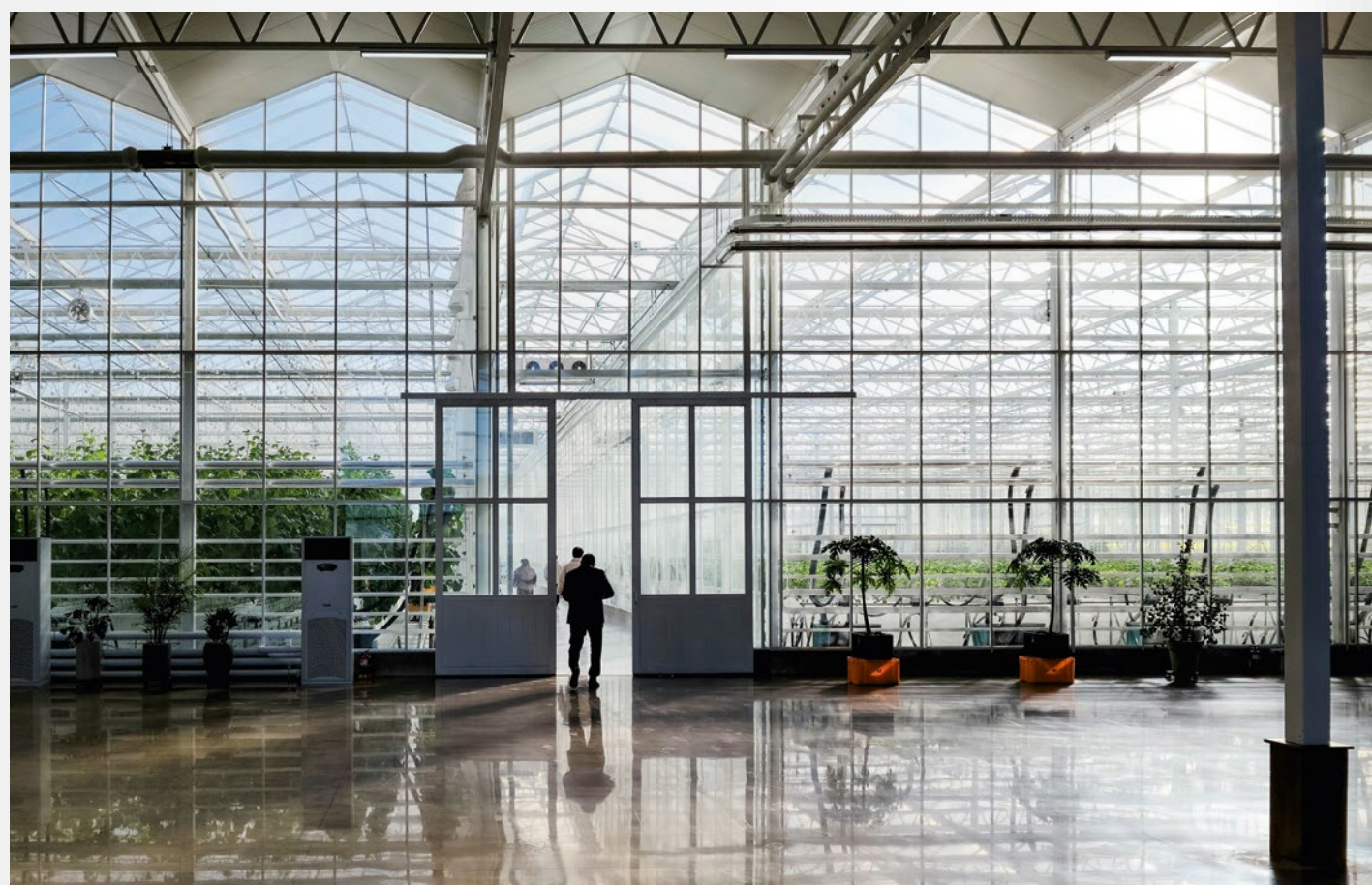
At its Guangdong headquarters, Hause manufactures for both residential and commercial customers.





# The smart farm

In Korea's Smart Farm Innovation Valley, tomatoes, strawberries and the like grow almost by themselves thanks to intelligent technologies. Fan coil units from Dowoo ENE with axial fans from ebm-papst ensure the perfect conditions.



In the greenhouses of the Smart Farm Innovation Valley, various plant species grow under optimal conditions. In addition to sufficient light, water, and fertilizer, the temperature is also ideal thanks to fan coil units from Dowoo ENE.

**L**ight, air, water, heat and soil with plenty of nutrients—these are the ingredients that every plant needs to grow. But for farmers, ensuring perfect conditions at all times is a challenge. Sometimes there's no rain, sometimes there's not enough sunlight. Wouldn't it be great to be able to control all these factors round the clock and adapt them to the needs of the plants? In Gimje, South Korea, that's exactly what farmers can do. This is where Smart Farm Innovation Valley is located—a state-owned agricultural business with a lot of high-tech.

Opened at the end of 2021, the Valley's main attraction is its modern greenhouses with a total area of nine hectares. Among them are a rental greenhouse, a training greenhouse for aspiring farmers, and a greenhouse for research and development. Here, agricultural scientists and companies are working on the agriculture of the future. They test current innovations in the field and collect data for in-depth analyses using the latest information and communication technology (ICT). Special medicinal plants such as tragacanth and licorice are also cultivated in the greenhouse.

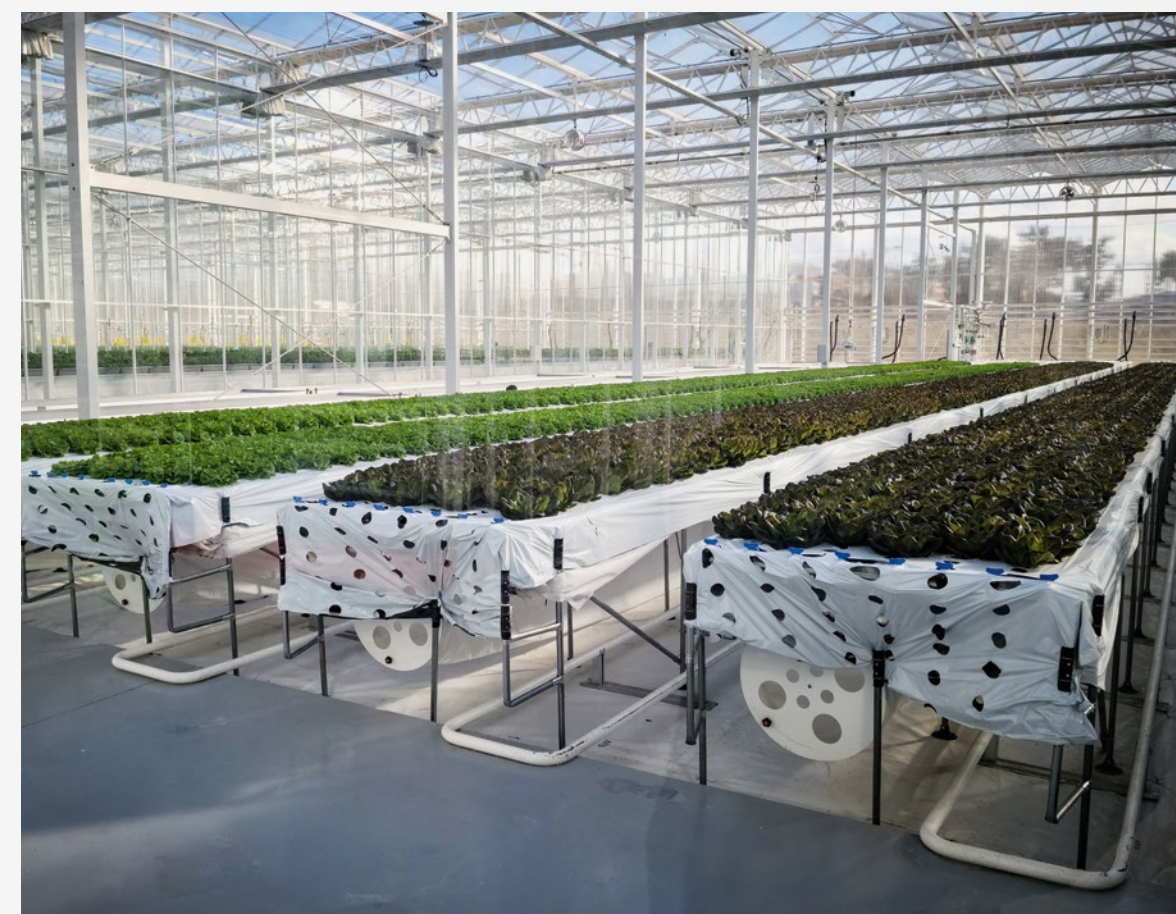
## *The right temperature in the right place*

Besides automatic irrigation and fertilization systems and additional UV lighting, 430 fan coil units from Dowoo ENE, a Korean manufacturer of air-conditioning equipment, are used throughout the

Valley. These units provide decentralized temperature control in many parts of the greenhouses to promote the growth of various plant species, and are used to both heat and cool the greenhouses. To achieve this, an EC axial fan from ebm-papst draws ambient air into each of the convectors. The air then flows over a heat transfer medium, which absorbs or releases heat depending on the setting. A filter then removes dirt and fine dust before the tempered air reaches the plants via a textile hose.

## *Environmentally friendly heat transfer medium*

Fan coil units function similarly to conventional air conditioners. What makes them special, however, is that they don't use any chemical agents as a heat transfer medium. Instead, water is used, which is tempered by a heat pump. This makes the convectors very environmentally friendly. And it also means that they are easy to install, maintain, and expand using a non-hazardous fluid such as water. In addition, Dowoo ENE has perfectly adapted its fan coil units to the requirements in the greenhouses. To achieve this, the company used computer simulations back in the Smart Farm Innovation Valley planning phase to determine what would be needed to provide uniform air conditioning for a large area. This also led to the choice of fans from ebm-papst. After all, in addition to a high air volume, the main requirement is compactness so that the plants still have enough space to thrive in peace. ●





# The wonders of rooftop heating

Photovoltaics and solar heating on the roof are normal phenomena. Why not put the heat pump up there, too? In the Netherlands, this idea solves several problems at once.

**T**he Netherlands has a space problem. More and more people are looking for affordable housing, but there are virtually no new construction areas—which is why old developments are making room for new buildings. These buildings are more modern, better insu-

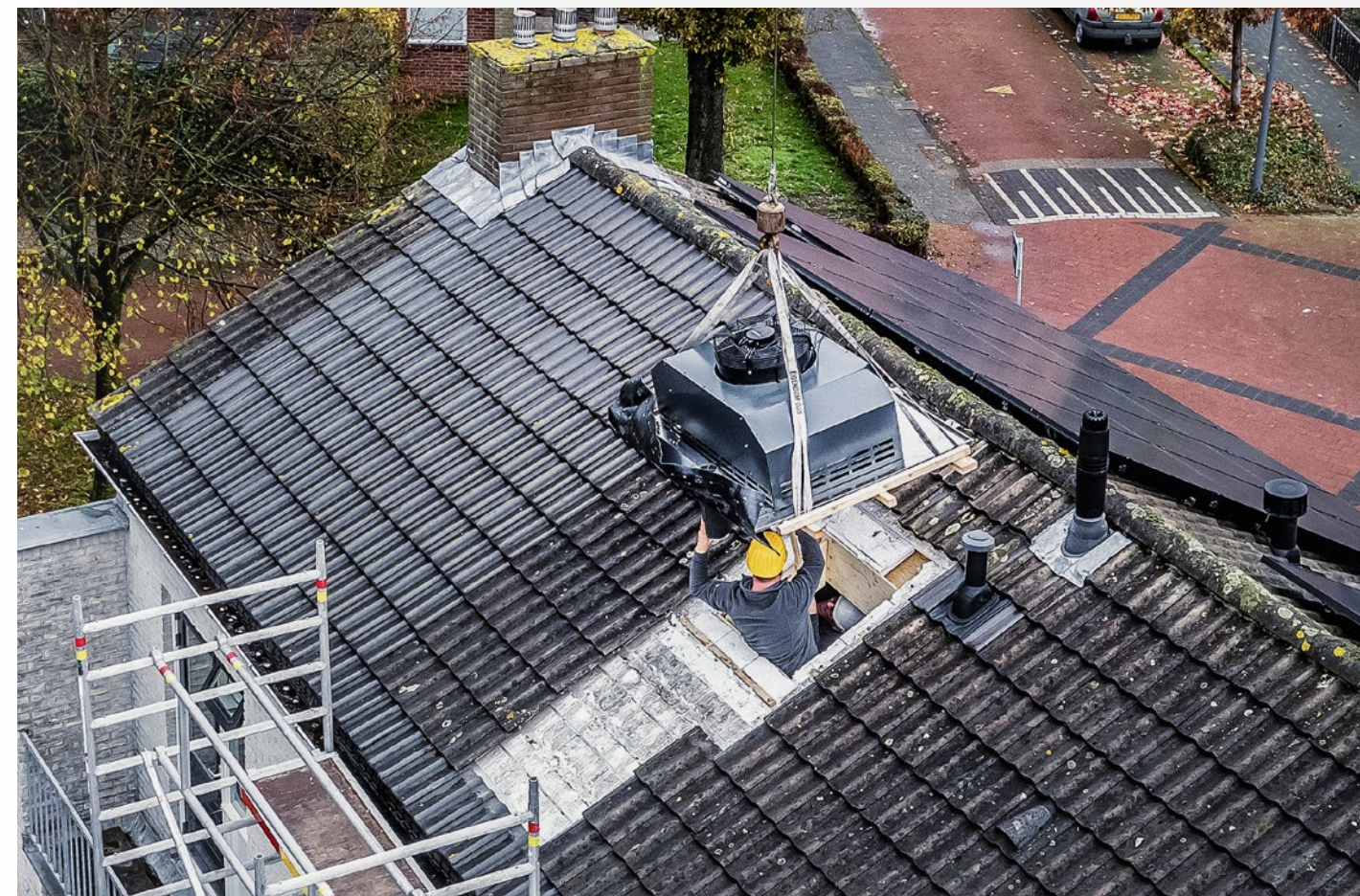
lated, and have energy-saving heating systems. But not more space. So where to put the heat pumps, which have to be placed at prescribed distances from neighbors due to strict noise protection regulations? Where to put the technology or hot water tanks if there is no boiler room or equipment room?

Cezar de Jong knows the answer to these questions: simply place the heat pump on the roof.

## *A crazy request*

Cezar de Jong works at Breman Installatie-fabriek, a division within the Breman Group that develops and manufactures heating equipment such as heat pumps. The whole roof project started in 2016. The company was asked to place the outdoor unit of an air-to-water heat pump on a gable roof. Dutch noise regulations require heat pumps to be placed only at a sufficient distance from the house. “We’ve been doing chimneys for about 30 years—putting things on the roof

The EQ-Air can also be combined with photovoltaic systems, making the heating solution even greener.



With the envisaged performance and working hours of the AxiCool, Breman is looking up to a 30-year warranty.

is nothing new for us,” Cezar de Jong says with a laugh. “But designing the outdoor unit of a heat pump for lots of roofs with different slopes was a challenge.” The result was the EQ-Air.

## *An extraordinary decision*

The EQ-Air is an air-to-air heat pump. A fan draws in outside air from three sides and sends it past a heat exchanger to the inside, from where it is distributed throughout the building. The conditions on the roof, close to the living spaces, gave rise to special requirements for the fan: “We needed a quiet, durable fan that could withstand the weather and work for different roof angles. In addition, we didn’t have a lot of time for development, and we also wanted a European-made product.”

That’s how in 2018, Cezar wound up at ebm-papst—with the AxiCool. This EC axial fan was actually designed for heavy-

duty use in places such as industrial cold stores. This means that it is robust, resilient, and has no problem with even icy weather. It is also very quiet even when running at full throttle. Perfect conditions for the job on the roof: “With a diameter of 50 centimeters, AxiCool can process more air volume at a lower speed than with a smaller size, which also minimizes noise from the moving air.” The result: The AxiCool runs at a maximum of 55 percent power while emitting around 28 decibels—that’s quieter than a whisper.

## *A good idea*

Meanwhile, supply bottlenecks put a lot of pressure on the project participants on both sides. Breman had received an order to equip an entire housing development with EQ-Air heat pumps. The delivery date was set and not far away. Open communication was the most important tool here: “All our contacts at ebm-papst told us honestly what was pos-

sible and what was not. We could and had to rely on a yes being a yes and a no being a no. That’s not always what you want to hear,” Cezar says with a laugh, “but essential for good collaboration.”

And that ensured that the delivery date could be met. Now, the Netherlands has its first housing development powered by rooftop air-to-air heat pumps. Over time, customer confidence in the product is also growing: “No one is offering anything comparable. This is a disadvantage at the beginning because potential customers initially prefer what they know. They can’t imagine that a unit directly on the roof won’t make a disturbing noise.”

The heat pumps in the housing development are proving to be very persuasive—and the residents are delighted. Breman is receiving more and more orders. Demand for space-saving, efficient heat pumps is growing exponentially. And shows that a good idea always comes at the right time. ●



## What The Tech?!

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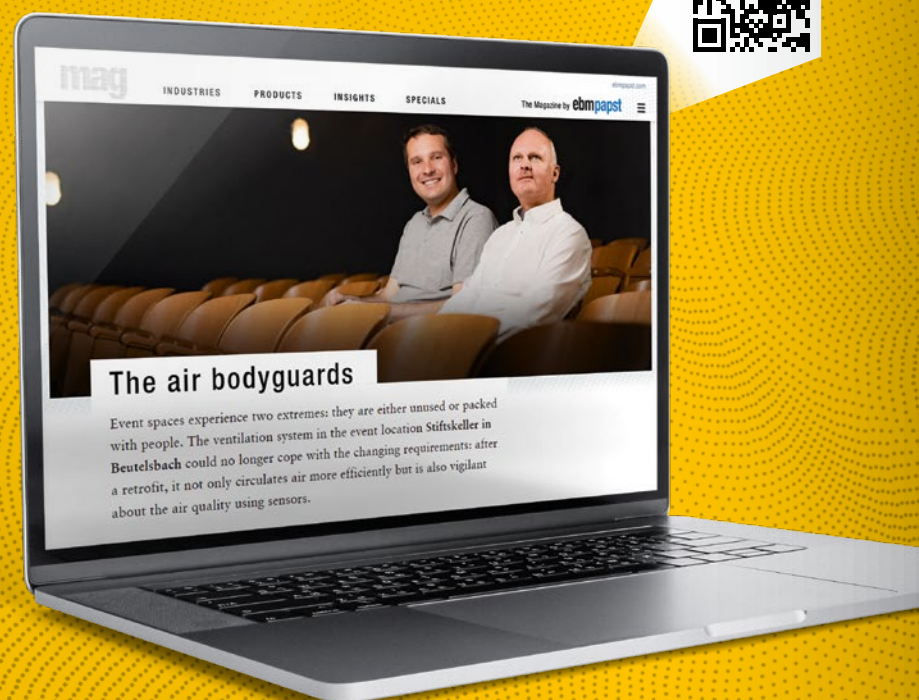
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$$M_{ip} = \frac{m_1}{\sqrt{2}} \times w \times \xi_p \times D_{as} \times l_{ax} \times (\hat{B}_{pd} \times I_q - \hat{B}_{pq} \times I_d)$$

Achieving the maximum torque for drives relies heavily on the air gap flux.

With the FanDrive DV280, we have launched the largest drive in our portfolio to date. It is intended to drive large impellers, for example axial fans of up to two meters in diameter. Powering these large fans efficiently while maintaining the smallest possible footprint, requires a correspondingly high torque. This was the task that the Development team was faced with solving.

As a basic principle, we achieve a higher torque by scaling up our drive concept—i.e. using a larger motor. To find out why this is, we need to take a look at the formula above. At first glance, there are several factors that can be used to increase the torque  $M_{ip}$ : The number of phases  $m_1$ , the number of strand windings  $w$ , the winding factor  $\xi_p$ , the air gap flux in d- and q-axis  $\Phi_{pd}$  and  $\Phi_{pq}$  and the amperage  $I$ . The air gap flux is the product of stator diameter  $D_{as}$ , axial length  $l_{ax}$  and flux density  $\hat{B}_{pd}$  and  $\hat{B}_{pq}$ .

In reality, however, not all of these factors can be used. For example, for design reasons, the number of phases needs to be kept as low as possible to be able to implement the product economically. For a conventional three-phase motor, the most sensible value is generally 3. The winding factor results from the selected motor topology and can only assume values from 0 to 1. A higher current will lead to higher losses in the motor and electronics unit, which not only reduces efficiency but can also result

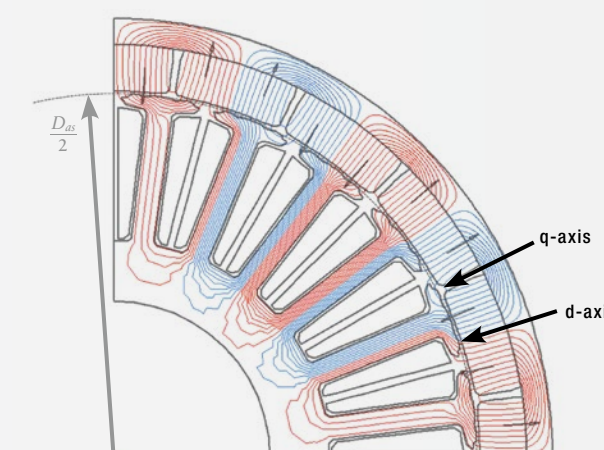
in excessive self-heating of the device. The number of turns per phase is limited by the speed to be achieved and the voltage. In turn, the amplitude of the air gap flux density is limited by the permanent magnetic material used. As a result, this leaves only the stator diameter  $D_{as}$  and the axial length  $l_{ax}$  of the active part as meaningful variables for the design. As can be seen from the formula above, the torque behaves proportionally to these variables. For this reason, the motor has to be large to achieve a high torque.

One requirement that limited the size of the drive with impeller was the need to fit it through a normal doorway. This is where ebm-papst's typical external rotor motor design comes into its own as, in contrast to the internal rotor motors normally used here, it can be integrated into the impeller. ●

Dr. Stefan Mathis,  
Coordinator for  
Motor Technology  
Innovation



Magnetic field lines of the motor when de-energized. The closer these lines are together, the higher the air gap flux density in the d-axis and q-axis ( $\hat{B}_{pd}$  and  $\hat{B}_{pq}$ ). The air gap flux is calculated as a surface integral of the flux density over the stator cylinder jacket area. The larger this area with a given air gap flux density, the higher the air gap flux. For this reason, the motor torque increases with the stator diameter  $D_{as}$  and the axial length  $l_{ax}$ .





# It's not only getting green...

...in the ebm-papst canteen. This year's trainees are focusing on the future topic of vertical farming.



Learning by doing: the ebm-papst indoor farm has become a real success thanks to this motto.

Vertical farming is an important topic for the future, both globally and at ebm-papst. This is why this year's trainees at St. Georgen and Mulfingen are working on the "ebm-papst Indoor Farm" project. Jessica Hund from Product Management for Compact Air Technology in St. Georgen came up with the idea: "We can tell customers a lot about our expertise and products in the field of vertical farming. But it's better if we show it in practice."

An exciting challenge for mechatronics engineers and electronic engineers in training: They researched and built everything themselves, from the composition of the nutrient solution to monitoring and evaluating temperature and humidity to harvesting plants. It's a success story for trainees and ebm-papst, who benefit equally from dealing with a hot topic.

*Everything grows as if by magic*

The indoor farm is a glass cube which now sprouts herbs without earth and without watering. Special LED strips ensure the necessary light, an automated control system regularly supplies the plants with a sophisticated nutrient

solution—in theory, nobody has to look after the small farm in the cube. Here, everything grows and thrives on its own under perfectly balanced conditions. This means that there are no pests, no overwatering, and always some tasty parsley or chives at hand. The canteen chef, who will be able to serve the herbs from the indoor farm in the future, is not the only one who is pleased about this.

The 48×108×174 cm farm contains four AxiRev 126 compact fans that ensure fresh and pleasant air. A BCI gear motor delivers the necessary power for the hose pump, which pumps the nutrient solution to the plant roots every three hours. They absorb these nutrients for 15 minutes, then the liquid is pumped out and filtered, which is called a hydroponic system. All the more impressive, that all this was achieved in just under two months.

As the indoor farm is mobile, it will travel to upcoming trade shows, demonstrating that vertical farming is no longer just a dream of the future. ●



YOU CAN FIND MORE INFORMATION AT:  
[mag.ebmpapst.com/indoorfarm](http://mag.ebmpapst.com/indoorfarm)

AdobeStock / Alexander Raths; Hans Jörg Kallert/runner

## AS COOL AS A CUCUMBER

The AxiACi series was mainly developed for commercial cooling devices, but thanks to its flexibility, it can also be used in industrial, switch cabinet, and telecommunications cooling applications. No matter whether it's salt spray or extreme heat: it stays cool even in tough environments.

The fans can be safely combined with natural refrigerants at temperatures as low as -40 degrees Celsius. The GreenTech EC motor ensures up to 83% less power consumption with the same air flow—and thanks to the optimized blade design, the fans are up to 3 dB(A) quieter than comparable models.

[ebmpapst.com/axiaci](http://ebmpapst.com/axiaci)



## MULTILINGUAL ASSISTANT IN THE BASEMENT

The Heat Interface Controller is the ideal control system for heat transfer stations in district heating networks. Located in the basement of apartment blocks or multifamily residential buildings, it regulates the distribution of hot water and heat. It establishes the connection to the cloud and LIN bus-capable components. It also speaks fluent MODBUS and Meter-Bus. It updates firmware and parameters wirelessly and measures energy consumption—all in a very compact unit.

[ebmpapst.com/heating](http://ebmpapst.com/heating)



## KEEPING EVERYTHING ON TRACK

The extremely compact and robust AxiEco Track is the specialist for air conditioners used on trains. Its aluminum housing and built-in resonance detection mean it can cope with virtually anything. It also meets the crucial fire protection regulations in the railway sector and generates only a small interference signal. This efficient, compact device provides a high level of counter pressure.

[ebmpapst.com/axieco](http://ebmpapst.com/axieco)

ebm-papst



# »Big performance for big fans«

The FanDrive DV280  
is the most powerful  
of the fan drives  
provided by ebm-papst.

Rainer Müller,  
who developed it,  
presents the new  
powerhouse.



*Which applications did you  
have in mind when developing  
the FanDrive DV280?*

Specifically applications involving ventilation technology, cooling towers, or process cooling where large fans with impellers of up to two meters in diameter are required. These applications often still use AC motors in combination with variable frequency drives, transmissions, or belt drives. The new, robust FanDrive DV280 delivers high power outputs of up to 24 kW and torque of 180 Newton meters, making it suitable for universal use on large fans.

*Does such a large unit not  
also use a lot of power?*

No, quite the opposite! Thanks to the state-of-the-art EC motor, the energy consumption and operating costs can be significantly reduced with the FanDrive DV280. That aspect is becoming increasingly important for operators. When the next stage of the Ecodesign Regulation for fans comes into force, if not before, many fans that are powered by an AC motor will no longer meet the minimum requirements for efficiency. When that happens, the right drive solution will be a high-performance EC external

rotor motor that operates at high efficiency levels. In addition, EC fans are infinitely adjustable and work extremely efficiently even in partial-load operation.

*Replacing such large fans is often  
a problem because of the lack  
of space. Is it the same here?*

We use an external rotor motor design, which allows for a much more compact unit than conventional internal rotor motors. This means that the entire fan unit requires less space, making transportation and installation much easier. For example,

when combined with one of our centrifugal impellers, the motor is immersed in the impeller because it is mounted directly on the external rotor. Even large RadiPac fans in size 800 therefore easily fit through normal doors. These compact plug-and-play units are delivered fully assembled to the construction site and are easy to install.

*Why is the integrated resonance  
detection function so important?*

Fan failures are often caused by vibrations generated due to the installation conditions. By detecting this at an early stage, we can significantly improve operational reliability. That is why we have integrated a vibration sensor. During commissioning, our customers perform a test start-up during which the vibration levels over the entire speed curve are analyzed. If excessive vibration velocities are detected, the control software automatically avoids these speed ranges during operation. ●



YOU CAN FIND MORE  
INFORMATION AT:  
[ebmpapst.com/  
fandrive](http://ebmpapst.com/fandrive)

Nominal service life of at least  
**40,000** hours

The FanDrive DV280 achieves  
power outputs of up to

**24** kilowatts



**Axial or centrifugal — it doesn't  
matter!**

The fan impeller can be mounted directly on the motor rotor by means of a flange.