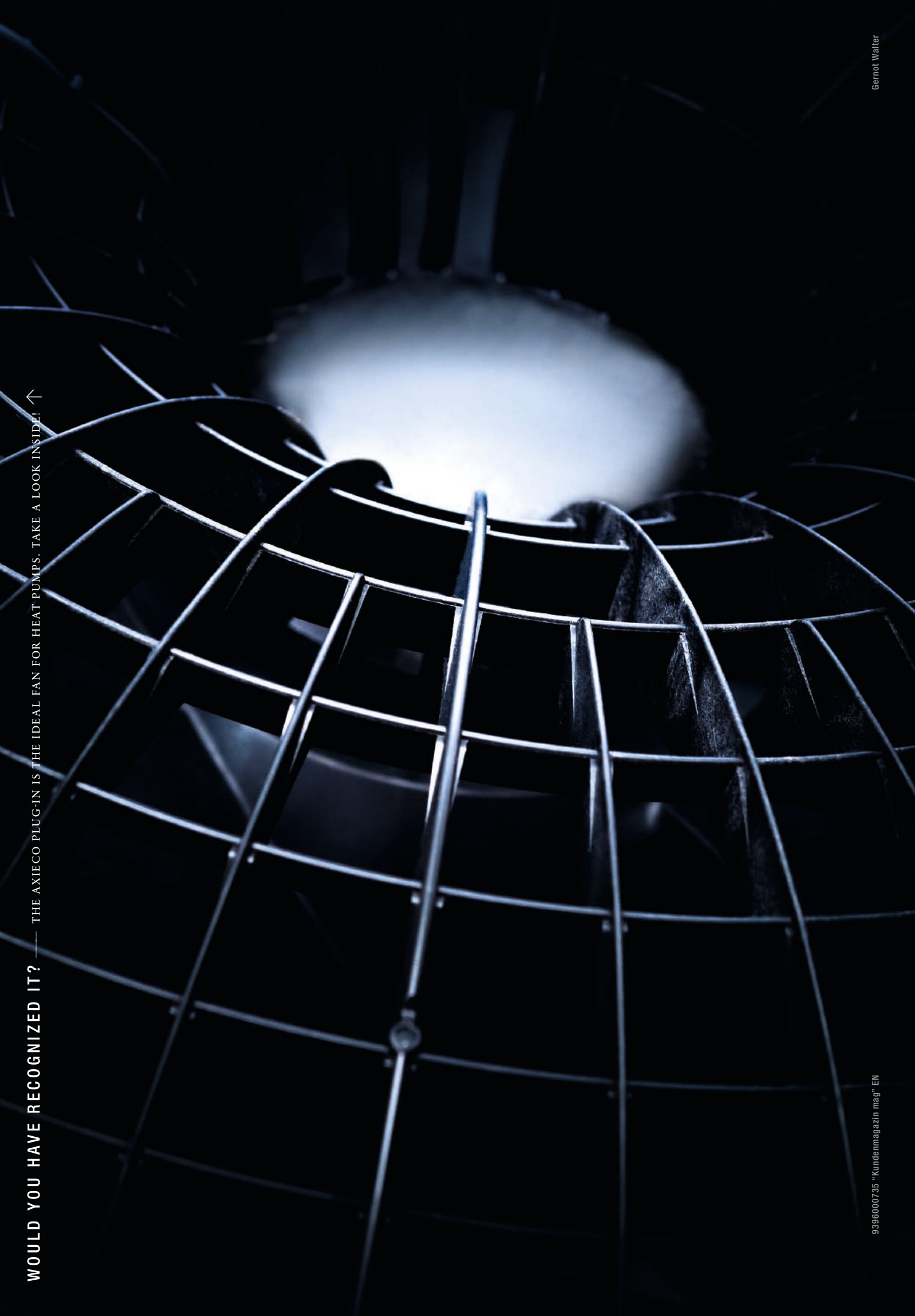


WOULD YOU HAVE RECOGNIZED IT? — THE AXIECO PLUG-IN IS THE IDEAL FAN FOR HEAT PUMPS. TAKE A LOOK INSIDE! ↑



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Gernot Walter



Lift me up!

Jinger McPeak and her team are advancing the development of more sustainable batteries for forklift trucks.

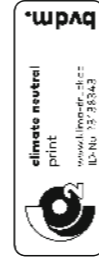


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Dear readers,

Companies are currently facing diverse and complex challenges. Meeting specification guidelines as well as corporate goals for greater climate protection, while simultaneously reducing costs, is not an easy task. This makes it all the more important to harvest “low hanging fruit” where they can be reached.

Retrofitting ventilation systems is an effective and easy way to save energy and, as a result, reduce CO₂ emissions and costs. A tailor-made modernization usually pays off very quickly, as shown by the example of Swiss milk processor Emmi on page 17: The highly efficient fans now cut their energy consumption by around 80 percent. Many companies could exploit this potential, as many old systems are still in use.

A retrofit not only saves energy, but also ensures significant noise reduction, and even improves air quality, as is the case at French textile company Deveaux (page 30). Thanks to intelligent fans, digital integration of the systems is becoming more feasible every day. By analyzing the data, the use of the fan can be further optimized.

The replacement is also very simple: We and our installation partners have a great deal of experience from the countless retrofits that we have carried out worldwide. That knowledge of the individual requirements of your application, combined with our plug-and-play solutions, usually means that the upgrade is completed within a few days. In the end, you too will be reaping the rewards of our work!

Thomas Nürnberg

CHIEF SALES OFFICER
EBM-PAPST GROUP AND
CHIEF EXECUTIVE OFFICER
AIR TECHNOLOGY APAC & MEA



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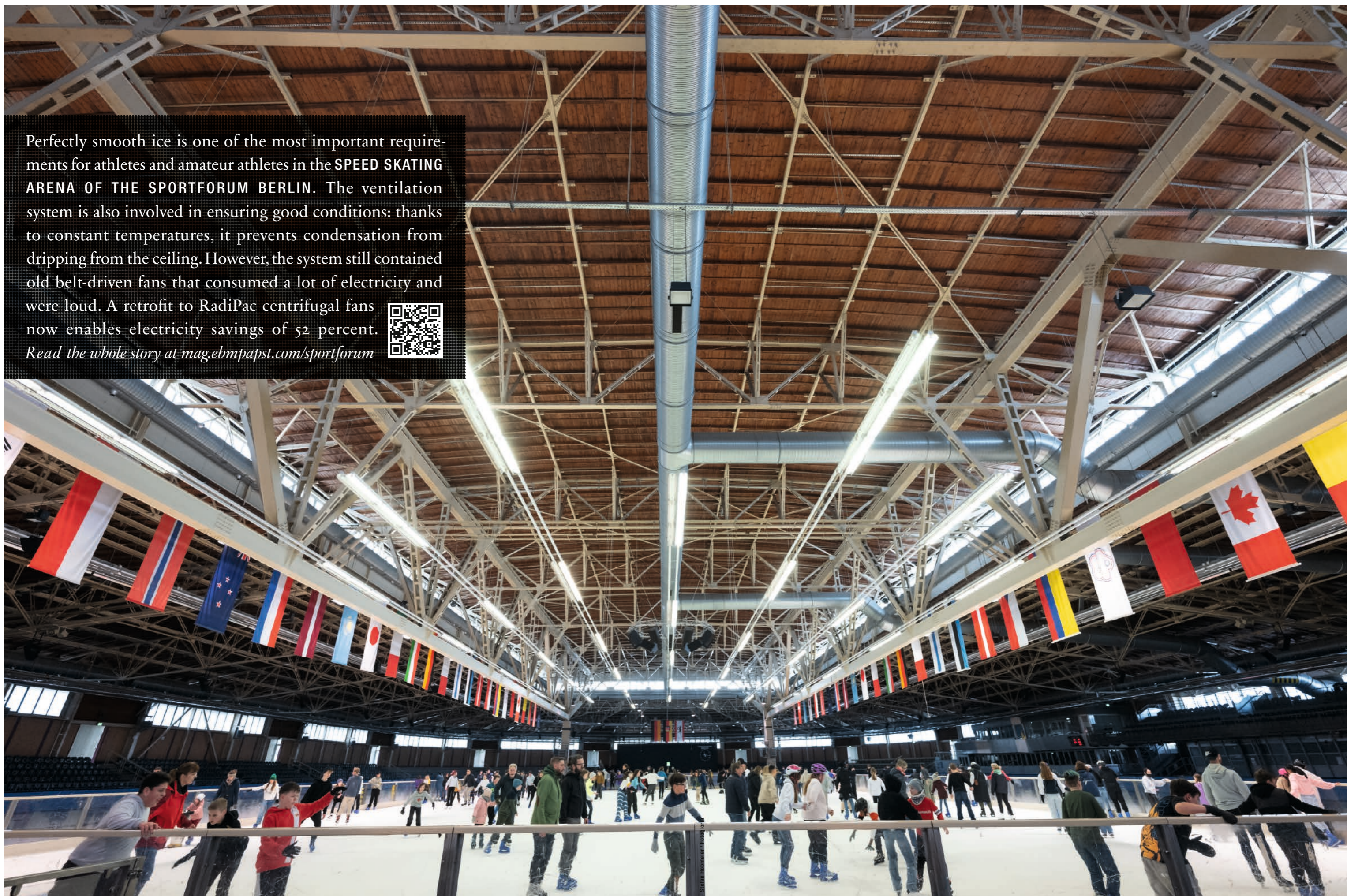
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The AxiEco Plug-in



At the new **DFB-CAMPUS**, Germany's young footballers keep a cool head even after a heated training session thanks to ventilation systems from NOVA Apparate GmbH. The systems rely on Ka2O technology with indirect evaporation cooling, which is particularly environmentally friendly and energy-efficient. RadiPac centrifugal fans are used to feed the cooled air into the team rooms and offices. The key feature is that the systems always draw in fresh air from outside, reducing harmful aerosols. And the football talents can take a deep breath and analyze the next opponents with a cool head! *Read the whole story at mag.ebmpapst.com/dfb*



Perfectly smooth ice is one of the most important requirements for athletes and amateur athletes in the **SPEED SKATING ARENA OF THE SPORTFORUM BERLIN**. The ventilation system is also involved in ensuring good conditions: thanks to constant temperatures, it prevents condensation from dripping from the ceiling. However, the system still contained old belt-driven fans that consumed a lot of electricity and were loud. A retrofit to RadiPac centrifugal fans now enables electricity savings of 52 percent.  [Read the whole story at mag.ebmpapst.com/sportforum](http://mag.ebmpapst.com/sportforum)



» Together for a sustainable future «

Since April 1, 2023, a new sustainability department at ebm-papst has been working exclusively on this topic and driving it forward. CFO Hans Peter Fuchs and ESG officer Klaus Wittmann talk about exactly what this means and what goals the company is pursuing.

ebm-papst has a long tradition of sustainability. So what is changing now?

Hans Peter Fuchs: Indeed, sustainability is part of our DNA. Since the company was founded, the focus has been on increasing the efficiency of products. At the new building in Hollenbach, we pursued green technologies and CO₂ savings in as early as the mid-2000s. Our apprentices that serve as Energy Scouts have been for energy guzzlers in production since 2010, which many companies have since been using as a model. It is not surprising that we won the German Sustainability Award in 2013 for all our efforts. All of our thoughts and actions are shaped by sustainability, but general conditions have changed drastically for all companies since the Paris Climate Agreement and the EU Green Deal: what used to come down to intrinsic motivation now is a legal obligation that we have to—and want to—fulfill.

Klaus Wittmann: The requirements now are hard numbers, data, and facts. Everything we do is also verifiable. This requires agile structures and an ambitious team. With the new

ESG (Environmental, Social and Governance) department, we are able to bring the company together globally and work together with all our sites.

The understanding of the term has also changed: so far, sustainability has often been equated with climate or environmental protection. However, sustainability is a holistic concept that includes social aspects and responsible corporate management in addition to the environment. We are now working on this systematically.

Nevertheless, let's talk about climate goals first: When he took up his position, CEO Klaus Geißdörfer said that ebm-papst has to become climate neutral more quickly. How quickly can that happen?

Wittmann: By 2025, we want to be climate neutral for Scope 1 and 2. The first priority for us is preventing emissions. Our focus is on continuing to drive energy efficiency projects forward. I am thinking of potential savings in building management, machinery, and our production processes. The second measure is investing in renewable energies for our

own requirements. We will be expanding or installing new photovoltaic systems and renewable energies wherever it makes technical sense. This also relieves the burden on the power grids and can cover a good portion of our required electricity. A third step will be to switch the electricity we purchase to green electricity as quickly as possible. By purchasing electricity from renewable energies by the end of 2023, we will manage to prevent about 60 percent of our total CO₂ emissions in Germany, China, the USA, and four other countries. Wherever it is technically impossible to prevent or reduce emissions, we use compensation certificates and support long-term climate protection projects.

How does this affect your own products, which are usually very energy-efficient?

Fuchs: Most of our products are so efficient that they consume relatively little energy. We will make them even more efficient and digitalize them even more so that we can save even more. But they will continue to consume energy in and of itself, also because they are often used for decades. For Scope 3, we therefore also need to look long term at

Klaus Wittmann and Hans Peter Fuchs are driving the topic of sustainability forward.



the energy mix used to operate our products in the application. Another important aspect that we are now taking into account more is the circular economy. That was not the focus in the past. Here too, a strong rethink is required. Because, on the development side, this affects how a product is constructed, so it can be dismantled again. And then there is the question of returning them, i.e. how do I bring these raw materials back into the cycle. We will also think about what suitable business models look like.

What do you see as the greatest challenge on this sustainable path?

Wittmann: For me, it is the cultural change that accompanies it. In the future, we need to think more holistically and always keep an eye on the issues of the environment, social aspects, and responsible corporate manage-

ment. This applies not only to those in charge, but to all employees. After all, everyone makes a contribution to this change and is an ambassador to the outside world.

Fuchs: The goal is to get so far that this is an almost subconscious process: Is the decision I make today also a sustainable one—for the climate and the company?

Surely customers will ask themselves: What does this approach to sustainability at ebm-papst mean for me?

Wittmann: Above all, I see the need for more partnership and greater collaboration and networking throughout the supply chain. Also in regards to the social aspects of sustainability, this will have a positive impact on working together. For me, sustainable business means “looking to the future together.”

When it comes to climate change, a significant improvement is only possible—especially in Scope 3—in partnership with the supply chain and with customers. Collaborating closely with our suppliers to analyze the supply chain is crucial to success. Reducing emissions in the product usage phase is only possible if we work more closely with our customers and also gain data on how and where our products are used.

Fuchs: Sustainability is an investment in the future. It is also important to understand that our customers expect us to be moving forward with sustainability! They are subject to the same requirements and we can help reduce their carbon footprint. To become climate neutral, we need to look at the entire value chain and get better and better. And this only works if we have our customers on board. ●



There is a whole lot of power in these boxes, which is key for hard-working forklift trucks in logistics.

Scott Van Osdol

COMPANY
Ethium by EControls

LOCATION
San Antonio, USA

The energy bundles

Ethium by EControls is leading the rapidly growing market for electrified forklifts in the USA into a new era: from lead acid to more efficient and sustainable lithium-ion batteries. The company has developed five pioneering technologies for this in five years. Only one question remains unanswered: Why is the old battery technology still in use?



Logistics closes the gap between production and consumption. Everything we buy in stores, order online or have shipped to our homes was manufactured, packaged and loaded elsewhere. And it's highly likely that at some point, a forklift truck did the work, in a logistics center somewhere in the world.

Forklift trucks are the busy bees in warehouse and logistics. They often work 24 hours a day, up to 365 days a year. The good news is that the majority of these millions of machines are now electric. The “bad news” is that the power usually comes from a lead-acid battery. Firstly, this is less environmentally friendly—the heavy metal lead is a hazard to health and the environment even in low doses—and secondly, it's strenuous for the forklift drivers on shifts. Working three shifts a day, the team has to replace the lead acid battery three times. After the eight-hour shift is over, the procedure is always as follows: Hook up the empty battery on the charging cable, measure the water level and add water if necessary, put the replacement battery in the forklift and move on to the next shift. A forklift truck therefore needs at least 2 to 3 lead acid batteries per working day, which have to be alternately charged, re-installed and

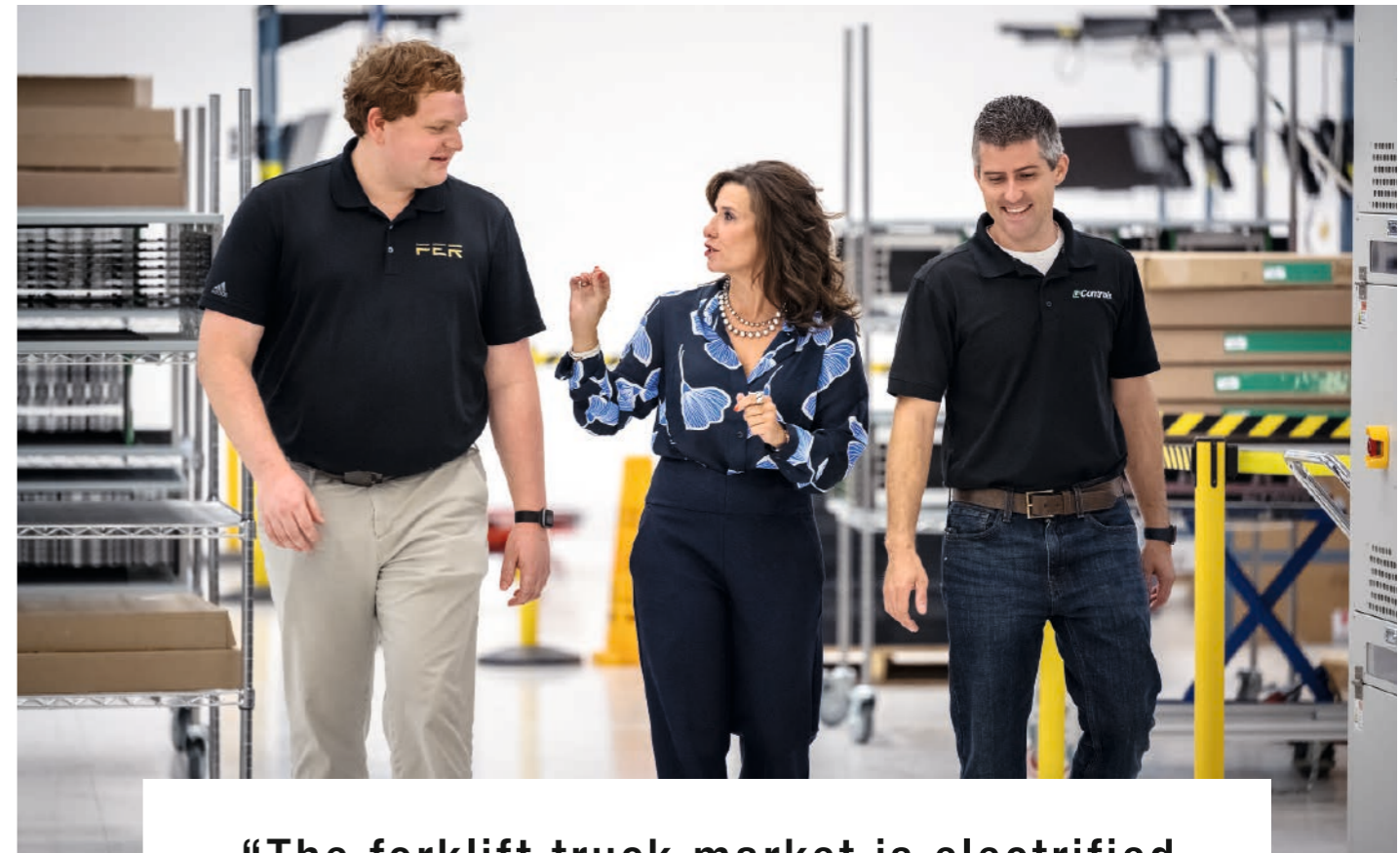
properly cared for to fulfill their service life. This costs logistics specialists time and money to deploy and maintain them.

Electrified—but how?

Ethium is an incubated start-up within EControls, a US leader and global provider of engine control solutions and fuel systems for forklift trucks. They know the market, understand how forklift trucks are used as well as how complex and expensive operation with lead-acid batteries is. Jinger McPeak, Vice President of Ethium, says, “The forklift truck market is much further ahead with electrification than, for example, the automotive sector. At Ethium, it was clear to us that the next step now had to be a more sustainable drive solution—so, we developed the most advanced battery on the market. We wanted to develop this solution using inspiration from our long time OEM customers who were part of this transformation.”

Ethium began to develop a lithium-ion battery for the forklift truck market in 2016. The parent company's many years of experience and data records from all of the calibrations, engine control systems and fuel systems for forklift trucks were

Jinger McPeak with two engineers at the San Antonio site in Texas where Ethium produces its battery solution. Collaboration within the team couldn't be more important.



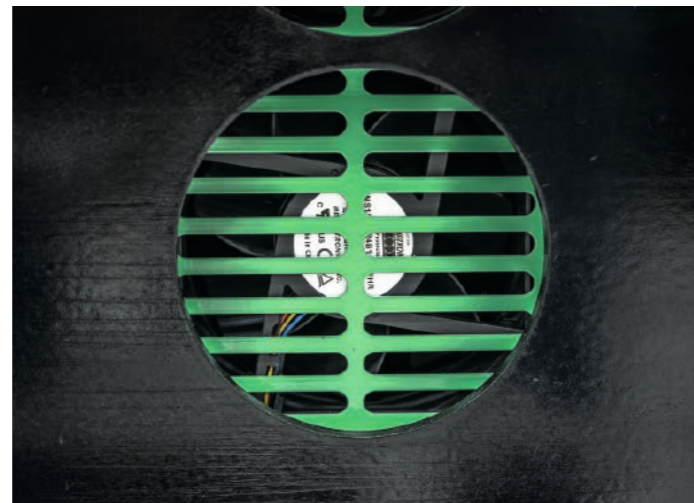
“The forklift truck market is electrified to a large extent. Now, together with the OEM, we are taking the next step towards a more sustainable drive solution.”

JINGER MCPEAK — VICE PRESIDENT ETHIUM BY ECONTROLS





The robust and powerful compact fan is required for actively cooling the battery.



advantageous for the company. Nevertheless, the developers started from scratch. “Every project at Ethium starts with a level 1 meeting. We put all our smart minds from the different disciplines into a room, throw the idea on the wall and ask, ‘what do you think?’ And then it is discussed and pondered. With 200 engineers at the company, many of them with PhDs, this can be a lively discussion,” explains Jinger McPeak with a laugh. “But we believe in vigorous debate and this is how the best solutions come about.”

“An engineering marvel”

For a total of five years, the engineers worked on the lithium-ion battery, and developed five sustainable technological advantages that ensure its safety and durability. Jinger McPeak calls it “an engineering marvel”: The battery box is more compact than a standard lead-acid battery, with double the charging capacity. In just one hour, it

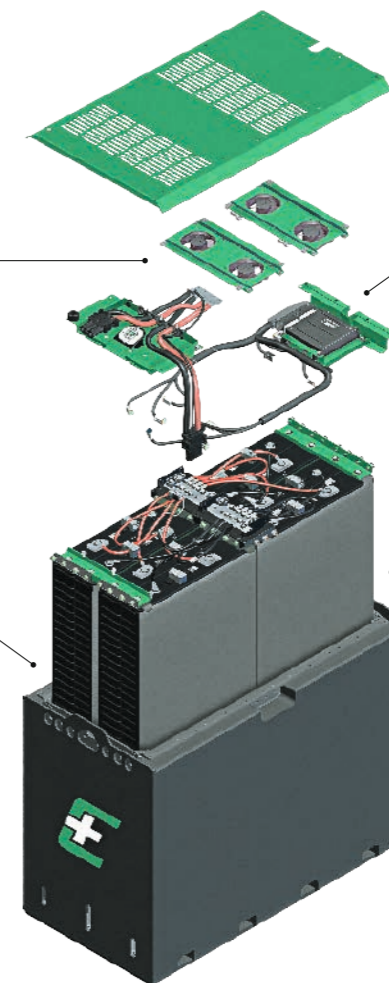
is fully charged, water and normal maintenance are not required, and it still has up to four times the service life. The environmental aspect was also important in the development phase, “the core of our solution is lithium iron phosphate (LFP). It is non-flammable, non-explosive, has a maximum service life and maximum discharge depth. It has neither cobalt nor nickel, meaning fewer raw materials.”

One of the five sustainable advantages is called “active balancing.” The “energy level” of the cells is constantly monitored and, if necessary, energy is fed from a full cell to one with a lower charge so that all cells are always charged and discharged evenly. This makes the battery much more efficient and prolongs its service life. For protection, Ethium relies on “active safety” and “passive safety” technology. Active safety involves monitoring the data that is constantly supplied by the battery management system and provides information about the current condition. Passive means that all cells

Scott Van Osdol

The active battery cooling system, each with four compact fans from ebm-papst, ensures faster charging and a longer service life.

The battery management system has smart electronics that monitor the energy flow within the cells. This ensures safety and optimization during charging.



The battery management system is the “brain” of the battery. It constantly measures all the important battery functions, such as charge status or temperature. The logistics specialists have access to the data at all times.

The battery modules are arranged in a honeycomb structure. This means that they can withstand severe stresses due to shock or vibration.

“The durability of lithium-ion batteries relies heavily on them always having a pleasant ‘T-shirt temperature’.”

JINGER MCPEAK — VICE PRESIDENT ETHIUM BY ECONTROLS

are connected using bonded wire: if a cell leaves its “comfort zone,” it is automatically switched off as with a fuse. Every module within the battery has its own Battery Management electronics providing the most intelligent and responsive of any battery on the market.

Temperature is an essential element in batteries. The technologies for this are “active heating” and “active cooling,” explains Jinger McPeak, “The

durability of lithium-ion batteries relies heavily on them always having pleasant ‘T-shirt temperatures.’ This is why our batteries are actively cooled and actively heated.” Sensors measure the temperature of many of the hundreds of cells per battery module—around 3,000 cells in total per battery box. If it is too hot or too cold, the battery management system sets the air conditioner or heating accordingly. →



Jinger McPeak and her team are proud of their innovative solution. Automated production with robots is just as modern.

They know what they want

The IP68-protected compact fan 4118/2H4PU from ebm-papst is responsible for active cooling. It extracts outside air through ducts in the battery housing, dissipates it through the metal side of the modules and cools the cells in a targeted manner. The compact fan is UL-certified, an OEM safety regulation that is required for use on the American market.

Joe Giacona, Director Transportation and Mobile at ebm-papst in Farmington, USA, says, "Ethium approached us for a robust solution for active cooling of their battery. Our team worked closely with their engineers and our colleagues in Germany to find the optimal compact fan that exactly met the performance requirements." Jinger McPeak emphasizes: "The fact that our engineers chose the compact fan based on its performance values and robustness, and decided against developing their own solution, definitely speaks for the product and is a compliment!"

Now, if a customer would like to switch from the lead-acid to the lithium-ion battery, they can simply replace the old battery with a new battery

from Ethium and off they go. Thanks to the standardized connections and the identical size, this transition is swift and simple.

But Jinger McPeak sees the wealth of data as one of the biggest advantages for customers. "Someone managing a forklift fleet needs reliable data around the clock: The battery provides a range of information, including on the battery charge status, service life and behavior during an average shift, via a web interface. No one has to guess or rely on their gut feeling. In the best case scenario, our customers even uncover additional logistics capacities and can use forklift trucks more efficiently without having to purchase new equipment."

Rapid battery change

Over the course of one shift, the drivers charge the lithium-ion batteries during their short work breaks. All in all, charging takes no longer than sixty minutes per shift. No need to measure the water level, add water, or perform maintenance. Several thousand charging cycles in 18 months without loss of capacity. "We are ready for the transformation," says Jinger McPeak. ●

COMPANY
Emmi AG

LOCATION
Luzern, Switzerland

Keeping milk cool

Matthias Künzli is actually a specialist for automation at the leading Swiss milk processor Emmi. In recent months, however, he has been working extensively on another topic that is close to his heart: modernizing the storage cooling system in the Suhr logistics center from the ground up, boosting its energy efficiency.





Out with the old AC fans: The retrofit with modern EC fans aims to help Emmi reduce its own emissions (Scope 1 and 2) by 60 percent by 2027.

W

“We have been working on energy optimization across all the media—steam, water, gas, electricity—for over ten years. This has helped us reduce consumption,” says Matthias Künzli. “With electricity, it is very easy to measure the savings with a simple before/after comparison. This is why our ambitious sustainability strategy allows projects in this area to be clearly communicated to the management team.”

A retrofit for demand-based cooling

The cooling system in Suhr is the perfect candidate for this: it is over 20 years old and simply no longer up to date due to the poorly controllable AC fans. Matthias Künzli got to work and took a closer look at the existing fans. “I was amazed by the high power consumption and the sheer amount of fans which are no longer needed at the logistics

center,” he says, adding, “the AC fans also had very poor efficiency levels.”

Matthias Künzli did not make things easy for himself. He meticulously refined his list of installed fans, performed consumption measurements, compared power classes and volume flow rates, and looked for partners to retrofit the evaporators. “I wanted state-of-the-art fans to install in existing devices,” he explains, “because the ceiling evaporators are very robust and have few wearing parts. Throwing them away is simply not sustainable.” But most of the refrigerator manufacturers he asked recommended exactly this approach. In 2020, Künzli attended a seminar by ebm-papst in Switzerland. “The employees helped me with my project right from the start. They did not say ‘it can’t be done’—that convinced me.”

As the retrofit was going to be performed while the system was in operation,

Matthias Künzli left nothing to chance during the preliminary planning. Together with his deputy Arber Gashi, he disassembled one of every evaporator type and equipped it with a fan from ebm-papst. “The aim was also to find out which brackets we required in order to attach the new fans to the existing evaporators, and to have them made in advance,” Künzli explains. The time came at the beginning of 2023 to make a start: Nine coolers were each equipped with three AxiEcos with guard grilles for short nozzles, and 27 others with three HyBlade axial fans each. Measurements taken shortly after installation show that the current draw per evaporator fell from eight amperes to one ampere.

Energy savings of over 80 percent

As well as the smooth conversion, Matthias Künzli is particularly pleased about the mea-



“Instead of the 50 percent savings expected, we are seeing savings of over 80 percent for most fans.”

MATTHIAS KÜNZLI

SPECIALIST FOR AUTOMATION AT EMMI

asurable result of the retrofit: “ebm-papst promised us energy savings of around 50 percent. In fact, most fans give us more than 80 percent. 50 percent thanks to the fans’ efficiency and another 30 because we were able to reduce fan speed as needed.” But it is not just the numbers that have inspired Künzli. “The new fans hardly make a sound. I had to take a look at the display to see if they were actually running” he explains with a smile. “At the logistics center, we have a loudspeaker system that plays music and messages during working hours, and now we can finally hear it! That is good news for our employees.” They also appreciate no longer feeling a draft after the retrofit: “We distribute the cooled air through textile hoses in the hall, which

previously generated a draft. It is barely felt now. We are even considering removing the textile hoses completely in some areas.”

Good planning pays off

By March 2023, two out of four floors were equipped with new fans. The basement is up next, with another 21 fans: “We can’t do the replacement until winter 2023/24 because for this we need cool ambient temperatures,” explains Matthias Künzli. He is pleased already: “When the entire project is completed in spring 2024, we will have a total of 206 new fans in operation and, according to current calculations, save around 550,000 kilowatt hours of electricity per year.” ●



COMPANY
Synergy Grill

LOCATION
Offord Cluny, UK

Efficient sizzling

Gas grills from British company Synergy Grill Technology are revolutionizing the catering industry, as they grill food energy-efficiently and with no fat. A system solution containing blower, venturi, and gas valve from ebm-papst, among other things, ensure that the heat is perfect.

Things often get heated in commercial kitchens. Orders pour in every minute. Chefs and waiters hardly have time to catch their breath. Everything has to happen quickly—after all, the guests are hungry. In this situation, it's good if you not only have experienced staff but also state-of-the-art kitchen equipment—especially when it comes to perfectly grilling large quantities of vegetables, meat, and fish.

Synergy Grill Technology, based in the British village of Offord Cluny, has the right product for this: a patented gas burner grilling system that allows all kinds of food to be prepared in a very short time. The system operates at extremely high temperatures that even atomize fat before it drips off. This saves chefs the hassle of cleaning the grill and disposing of the fat. What's more, the vapor released from the fat and oils during cooking is absorbed back into the food, making steaks and other treats particularly delicious and juicy.

A familiar problem with grills is hotspots, where the food cooks faster than at other points on the grill.

But Synergy Grill Technology has a solution for this: the company relies on a specially developed heat bed made of ceramic. Together with a gas blower from ebm-papst, it ensures that the heat is optimally distributed and the food is cooked evenly everywhere. The ceramic bed also stores



With extremely high temperatures, the gas grills from Synergy Grill Technology atomise dripping fat. This makes vegetables, meat, and fish particularly juicy.

a lot of heat, meaning that the grill needs significantly less energy to stay at operating temperature. Another plus point in terms of energy efficiency is the special gas supply. The grill system runs on a perfectly balanced gas-air mixture achieved by using a NRV77 gas blower with venturi and gas valve from ebm-papst, which regulates the mixture of gas and air before combustion. In this way, the grill system uses up to 59 percent less gas than other burners on the market. This saves a lot of resources and costs.

The grill system not only ensures better ambient air, but also protects the chefs from burns thanks to a specially designed cooling system for its surfaces. In the purely electric version of the grill, the blower prevents electronic components from overheating by drawing in cool air. It directs the grill's air, which is up to 180 degrees warm, to the hot plate—thus saving energy. In this way, chefs can keep a cool head despite the extreme heat of the grill—even if the next orders are already waiting. ●



Located in Menred's more than 60,000-square-meter, climate-neutral company park is the Holiday Campus — an ultra-low energy building full of smart technology.



COMPANY
Menred Group

LOCATION
Wenzhou, China

On a path to building green

Carbon-neutral building is an important step towards climate neutrality. Menred is developing multiple solutions, including integrated heat pumps, ventilation systems, and a smart home system, to help achieve this goal. All these technologies are combined under one roof in the Holiday Campus in Wenzhou, China.

The Menred Group's Green Building Industrial Park in Wenzhou City covers an area of over 60,000 square meters. The photovoltaic panels installed in the development generate more than one million kilowatt hours of electrical power per year. As a result, the system saves almost 1,000 metric tons of CO₂ per year compared to coal power generation.

Low-energy technology for carbon neutrality

In addition to factories and office buildings, the Holiday Campus is located in the climate-neutral industrial park. The building has many uses, including as a hotel for corporate guests and, in line with Menred's mission—innovation for carbon neutrality in buildings—it is a ultra-low energy building. Buildings like this are an important step towards carbon neutrality: They consume almost no energy and emit very small amounts of CO₂ during their lifetime.

Particularly economical technologies such as heat pumps and air handling units with heat recovery are therefore used for heating, cooling and ventilation. The little energy required is ideally gener-

ated by the building itself, for example using solar heating for hot water and photovoltaics on the roof. As a result, the building's total energy requirements and CO₂ emissions are virtually zero.

Sustainable strategy since 1995

Since it was founded in 1995, the Menred Group has been manufacturing environmentally friendly products for buildings like these in the areas of air conditioning, heating, fresh air, water treatment and smart homes. In fact they have already been working with ebm-papst on residential ventilation for ten years: "Systems like ventilation systems run 24 hours, 365 days a year. Efficiency and reliability are our customers' most important concerns, so the fans have to meet the highest standards—hence our long-standing collaboration with ebm-papst," explains Chen Wei, General Manager of Zhejiang MENRED Environmental Technology Co., Ltd. The company's sustainable technologies are turning new buildings around the world into ultra-low energy buildings, while existing buildings can also be retrofitted for energy efficiency. →

An almost completely climate-neutral Holiday Campus

Planning for the Holiday Campus began in 2012, and it was completed in 2017. The building houses many different areas under one roof: rooms for guests, lounges and meeting rooms, a playroom and adventure room for children. Each room has different climate and ventilation requirements, but must offer comfort and a pleasant environment for users at all times. How can this be reconciled with the ultra-low-energy standard? Where can the most energy and CO₂ be saved?

From previous building experience, the planning team knew that ventilation and air-conditioning systems in their region account for the largest share of energy requirements, at around 70 percent—so the potential for savings was particularly high. On the other hand, the site was very dynamic: a changing number of hotel guests, at sometimes a fully occupied playroom with children romping around or an important business meeting with customers. The result was a wide variety of rapidly changing requirements for heating, ventilation, dehumidification and air purification.

Mix of fans for efficiency

The planning team made a decision: A total of 13 fans, including several different models, were to be used in the Holiday Campus—hand-picked to best suit each floor or room. Three aspects were crucial to Menred in the selection process: energy

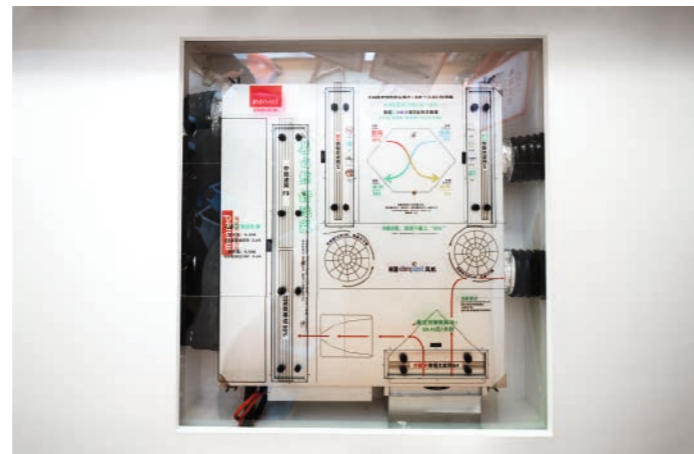
A total of 13 fans of different types were installed in the Holiday Campus—optimally designed for each room and its use. From the ceiling ventilation system to the underfloor convectors to the integrated heat pump.



“The combination of these fans results in energy recovery at 70 percent in cooling mode and 78 percent in heating mode.”

CHEN WEI

GENERAL MANAGER AT MENRED



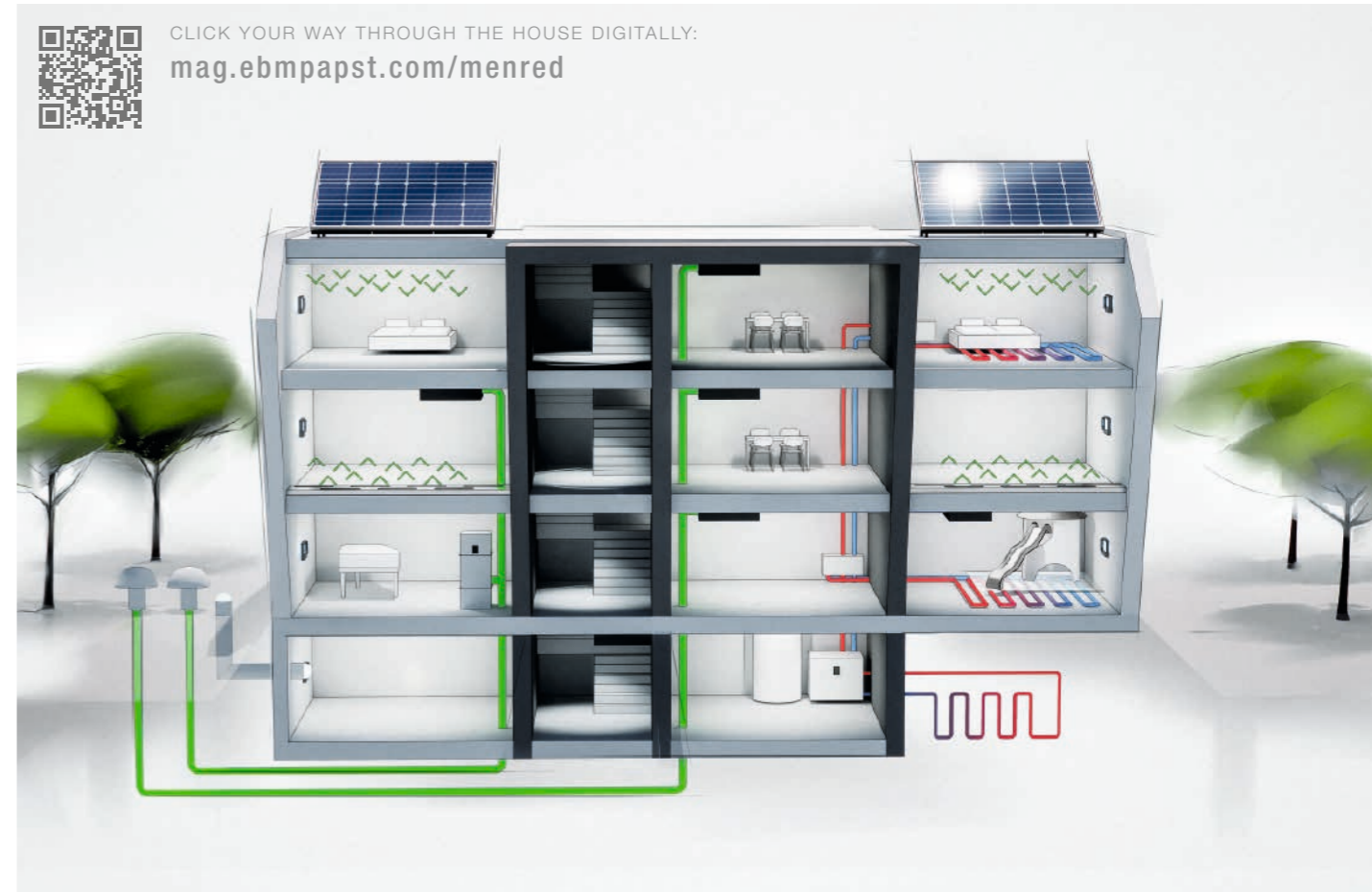
savings, comfort for residents (meaning a minimum noise level), and the possibility of adjusting the fan speed as needed.

The fans had to be controllable because the Holiday Campus has a smart building management system, a MiBEE smart home system that coordinates systems such as air conditioning, ventilation and underfloor heating in real time. Sensors measure the CO₂ and moisture content in the air, among other things. Based on these measurements, the systems ensure optimum air quality to guarantee the health and well-being of the people in the rooms.

The music room on the second floor, for example, is usually very busy, which is why Menred installed a ceiling ventilation system there with connected temperature control. Depending on the number of people in the room, the system cools or heats it accordingly. The system contains four centrifugal blowers that draw in and distribute air efficiently and with minimal noise.

An integrated heat pump for heating and ventilation

On the third floor of the Holiday Campus, Menred installed an innovative solution: an integrated heat pump environment



The almost completely climate-neutral Holiday Campus by Menred: full of smart technology, from the basement to the roof, from the heat pump to the photovoltaic system.

control unit, or “IEU,” that combines air conditioning, purification and dehumidification in a single device. Inside, there are two centrifugal blowers and one forward-curved motor-impeller per unit. “The combination of these fans results in energy recovery at 70 percent in cooling mode and 78 percent in heating mode. This exceeds the technical standards for ultra-low energy buildings and is a new, environmentally friendly solution for residential buildings,” explains Chen Wei. The annual energy consumption of the fresh air unit in

the Holiday Campus is only 15 kWh/m², which is below the standard value for ultra-low energy building.

Of course, the energy consumption of the entire Campus is also measured and monitored at all times. The Menred team can not only see the current energy consumption and operating status on the control panel, but also draw conclusions for the future. Where can even more energy or CO₂ be saved? Not only in the Holiday Campus, but in all buildings that are equipped with their efficient technology. ●



COMPANY

Lehner Maschinenbau GmbH

LOCATION

Westerstetten, Germany

Partner power at 12 volts

Lehner Maschinenbau develops and sells powerful spreaders for agriculture and municipal use. The key feature is that they work with on-board power but are still more powerful than comparable agricultural machinery. The company's success would be inconceivable without tuned up industrial components and a strong partnership.



Reinhard Sommerreißer (left) and Thomas Renz examine the radial blower made fit for outdoor use.

BLOWING RATHER THAN HURLING

The VENTO offers four different container sizes, which can accommodate 120 to 500 liter mixtures of catch crops, fine and coarse seed, micropellets, fertilizer, and grasses.



The powerful centrifugal blower is equipped for working in tough conditions with wind, dust, and bad weather, operates with 12-volt on-board power supply, and can be easily regulated from the driver's cab — and is continuously adjustable from 0 to 100 percent.

Pneumatic spreading via several hoses ensures targeted, uniform sowing even with very heterogeneous seed. The VENTO can easily reach a working width of up to 12 meters!

W

What do rice farmers in Vietnam, the municipal winter road maintenance service in Finland, and a farmer in South Africa have in common? They are all fans of a 40-person operation in a picturesque corner of southwest Germany — because their vehicles include equipment made by Lehner Maschinenbau GmbH. The company is a spin-off of Lehner Agrar GmbH, which sells seeds, fertilizer, and pesticides. When, in 1989, agriculture in the region suffered from a plague of snails, this local company started constructing a 12-volt spreader. Gradually, spreaders were added for all kinds of purposes and vehicle types, from quad bikes and cars to fire trucks. The pragmatic and powerful solution entered a gap in the market and offered sufficient business to become its own company, and so Lehner Maschinenbau GmbH was born.

But technically, things did not always go completely smoothly: the motors in the “polar bear” salt spreader, which is now called POLARO, failed one after the other.

The supplier at the time could not or would not take care of the problem. “In contrast, ebm-papst’s sales team immediately took a genuine interest and attended to it,” recalls Managing Director Thomas Renz. Together, Lehner and ebm-papst turned a drive that was actually developed for relatively clean industrial use into a robust solution for the harshest environmental conditions in ice, snow, dust, cold, and heat. The power bolt, which is wrapped in a heat shrink tube, even continues to work reliably under water, something that Lehner demonstrated at Agritechnica, the world’s leading trade fair for agricultural technology, where the POLARO was operated in an aquarium. The spreaders are now used for salt spreading during winter road maintenance as well as for rice fertilizing in subtropical countries, for example. They have a minimal failure rate in these demanding ambient conditions. Since then, Lehner Maschinenbau has been working together with ebm-papst

for over 20 years, which has resulted in another favorite among farmers: the VENTO. The pneumatic hose spreader can be used to efficiently spread seed, fertilizer, granules, grasses, and catch crops. “It was clear to us that we had to move away from disc spreaders to a pneumatic solution for this application,” explains Renz. This is because, especially when sowing catch crops, the seed sizes are highly variable. When ejected onto the field from a rotating plate, the different-sized grains fly over different distances, and are therefore not distributed evenly. With the VENTO, a powerful centrifugal blower blows the seed into several hoses, ensuring targeted, uniform sowing.

“Based on the performance data, an industrial fan was best suited here,” explains Reinhard Sommerreißer, the ebm-papst sales representative responsible for Lehner. But there was still a lot to do in terms of making it robust against wind, weather, and dust. “Lehner really tested and tried out a lot of things here to get the industrial blower fit for agriculture. To achieve this, we also adapted some things in its construction.”

The result is a solution that is currently unique on the market: Where the competition offers four to six meters of working width, the VENTO effortlessly manages up to twelve meters — and all of this with a 12-volt on-board power supply. In addition, the high-performance blower can

“It was clear to us that we had to move away from disc spreaders to a pneumatic solution for this application.”

THOMAS RENZ

MANAGING DIRECTOR LEHNER MASCHINENBAU

be conveniently regulated from 0 to 100 percent from the tractor cab, adapting to the travel speed, for example.

“Our collaboration has been so successful simply because of the good, trust-based communication over all these years,” emphasizes Thomas Renz. “When we have an idea, we always find a solution together. We simply feel at home with ebm-papst.” ●



Two protective sleeves: A brush is integrated into the housing (left) which removes dust and dirt from the centrifugal blower in the VENTO. Thanks to the protective hose, the drive for the POLARO can even operate underwater.

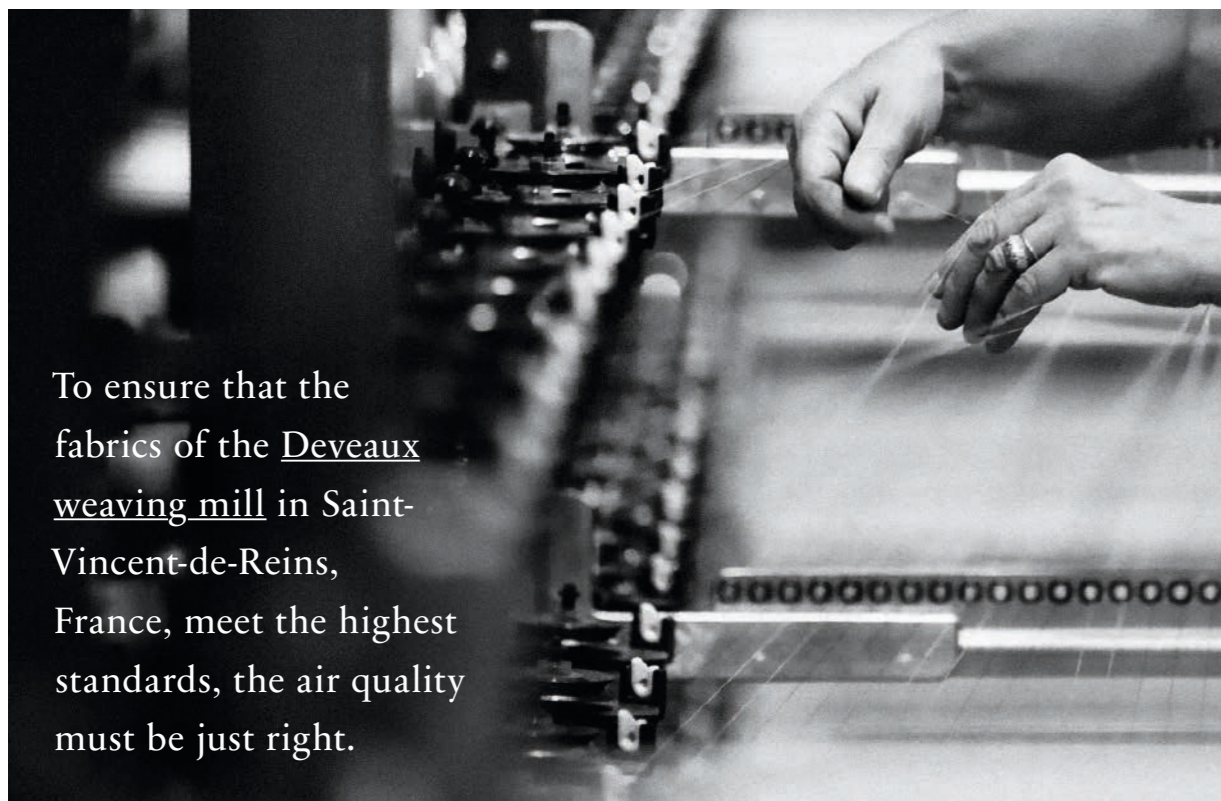
COMPANY

Deveaux SA

LOCATION

Saint-Vincent-de-Reins, France

Good air quality in the mill



To ensure that the fabrics of the Deveaux weaving mill in Saint-Vincent-de-Reins, France, meet the highest standards, the air quality must be just right.

Fabrics that are flowing or robust, playful or elegant, modern or classic, striking or discreet: in the Deveaux fabric storage facility in Saint-Vincent-de-Reins, about 70 kilometers northwest of Lyon, you can see and feel that this is where creativity and skill are interwoven. Deveaux has been producing textiles for over 200 years—currently with 37 employees and 63 looms. Every day they transform the finest cotton into up to 10,000 meters of fabric. And both man and machine depend on good air quality in the mill.

Thibaud von Tschammer, Managing Director of Deveaux, explains: “We process cotton into luxurious fabrics and stable humidity is essential for this. If it is not right, the looms react and productivity can be halved. If the air is too dry, for example, the yarns can easily break. However, the ideal levels vary from material to material.”

It’s just as important that circulation keeps the air clean: “The fine dust from the cotton otherwise settles on the textiles and makes work in the mill unpleasant,” says von Tschammer.

The height of fashion

That’s why 20 years ago, Deveaux decided to work with installation company J.Moos, also based in the Rhône-Alpes region, to bring their ventilation system up to the then state of the art. But like moths to a cloth, the ravages of time gnawed away at the system. “At the time, we had a particularly advanced ventilation system installed by J.Moos, which made a decisive contribution to the quality of our fabrics and hence to our good name in the textile industry. But like fashion, tech-

nology continues to evolve. So we decided that the large system, which was consuming a lot of energy and was not flexible enough to adapt to changing requirements, needed to be upgraded again,” says von Tschammer.

Enter FanGrid

At the end of 2022, there was a cleanout: Instead of the four outdated AC axial fans in the air handling unit, Deveaux received a total of 48 centrifugal fans from the RadiPac series from ebm-papst. With two fan walls of

24 RadiPac each, it is ebm-papst’s largest FanGrid project in France to date.

It was clear to Hugues Letombe, the owner of J.Moos’ supplier Deressy Charlas, that it had to be RadiPac to meet Deveaux’s requirements. As he explains: “When J.Moos contacted us about retrofitting old generation axial fans, I immediately thought of ebm-papst and its latest RadiPac fans. They work very efficiently, can be easily plugged together to form a FanGrid thanks to their cube design and have automatic resonance detection on board. This point was particu-

larly important for Deveaux’s existing system so that it would last a long time. And indeed, this solution is proving to be more efficient and reliable, much quieter, and more energy-efficient and sustainable.” Pascal Magnin, Technical Director at J.Moos, confirms: “The new system is four times as quiet as the old one, and Deveaux is currently making energy savings of 30 percent.” ●



For the luxurious fabrics of Deveaux, stable humidity is needed in the weaving mill.



Everything safe and dry

Vilpe Sense from Finnish company Vilpe detects leaks before water damage occurs. The system dissipates excess moisture to the outside, by using an EC centrifugal fan from ebm-papst.

Water damage in the roof is costly. To prevent damage from happening, Vilpe Sense monitors and vents roofs and building envelopes as needed.

COMPANY
Vilpe Oy

LOCATION
Mustasaari, Finland

Sometimes the smallest things have a big effect. A tiny hole in the bitumen on a flat roof, for example. If it remains undetected, moisture will penetrate the building. By the time it's noticed, the water damage is already done, and fixing it will entail costly renovation work. To stay one step ahead of moisture, Finnish company Vilpe has developed Vilpe Sense. It monitors moisture in buildings and dries or ventilates it as needed. A sensor measures the temperature and relative moisture in the insulation layer, while another sensor records these values for the outside air. If the system detects excessive moisture in the insulation layer, the facility manager is informed via an app and the fan installed on the roof starts automatically and runs at the required speed until the moisture in the building envelope is back within an acceptable range.

No chance for mold!

Veli-Pekka Lahti is the Director of Research and Development at Vilpe. "In Finland, we have snowy winters, which increases the risk of damage to roofs," he explains. "There is also a lot of technical equipment installed on them these days, such as solar panels, cooling and ventilation systems. This means that damage to rooftops can happen quickly." But Vilpe Sense not only detects damage to roofs, it also helps dry out new builds: "During the construction phase, moisture is naturally introduced into the building. Reliable ventilation is essential here, otherwise mold will quickly form," explains Lahti. "It is difficult to provide good air in residential spaces if the building envelope isn't healthy."

Efficient ventilation when necessary

What is special about the solution is that it works according to demand. An intelligent algorithm controls the speed of the fan installed on the roof. The fan only starts when the sensors in the building envelope detect moisture. "When temperatures outside are cold, the system automatically reduces the speed of the fan because we don't want to remove heat from the interiors," explains Lahti, adding: "When the roofs heat up a lot in the summer and the moisture evaporates, Vilpe Sense detects this as well and increases the flow rate. Along with the moisture, it then blows the heat out." A four-month test at the Vilpe lab in 2021 found a total of about 692 kWh of excess heat energy dissipated by the system. "This saves energy that would otherwise be used to cool the interiors. So we are operating in a very energy-efficient way," says Lahti.

RadiCal for extreme conditions

The efficiency of the components used was of corresponding importance. Lahti and his team opted for EC fans from ebm-papst's RadiCal series. They operate economically and are also extremely robust. "We have temperatures ranging from minus 40 to over 50 degrees Celsius in the insulation layer. Our products and their components have to withstand this. With ebm-papst fans, we know they are robust enough. We've put them through numerous tests and have been using them for many years." Another plus: They operate very quietly. Since they do their job on the roofs of residential and office buildings, loud fan noises would be unacceptable.

Water damage is a thing of the past

The Vilpe Sense system is now in use on an increasing number of factory and school roofs in Finland. As Lahti explains: "Water damage due to flat roof degradation is much more common than many people think. In workshops, I often ask if anyone has ever seen a janitor place a bucket under a leak. Usually, half of the participants then put up their hands. With Vilpe Sense, janitors no longer need to do this." ●

What the tech?!

Video knowledge at mag.ebmpapst.com



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$$Q_{OA} = k_0 - k_1 \times N - k_2 \times S - k_3 \times T - k_4 \times H$$

The quieter a heat pump is, the better. However, reducing noise is not the only factor. It also matters how pleasant the sound is.

And that can now be calculated.

Directives, such as “Technical Instructions for Protection against Noise 6.1” in Germany, regulate how loud a heat pump is allowed to be. In a residential area, for example, it can operate at 40 dB (A) at night. These are strict limits and the following applies as a basic principle: the fewer decibels, the less trouble is caused with the neighbors. But there are other factors that make all the difference in the end. In standardized experiments, psychoacoustics investigates how pleasant different people find a noise and translates this into objectively measurable values.

The final value we are talking about here is the psychoacoustic overall quality of a sound, Q_{OA} . The higher the Q_{OA} , the more pleasant the noise is to human ears. ebm-papst maintains its own psychoacoustics laboratory and has tested various compositions of heat pump noises on over 100 subjects. Four parameters are relevant for the Q_{OA} in this context: N is the loudness, measured in the unit sone. It indicates how loud a noise is for human hearing. S is the sharpness, measured in the unit acum. It indicates how many high frequencies a noise contains. T is the tonality, measured in the unit tuHMS. It indicates how disruptive individual tones in a noise are perceived as being. H is the Shannon entropy, measured in bits. It indicates how much a noise changes over time and how randomly this happens, e.g. swelling and subsiding.

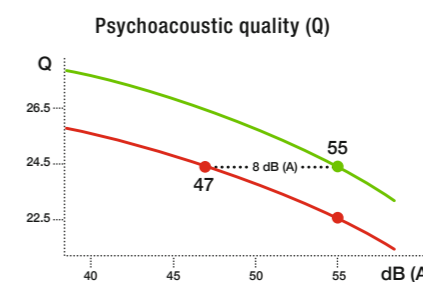
From the hearing tests, it is then possible to determine the preferences and incli-

nations of the subjects and to weight them statistically. The statistical calculations give a value to the preliminary factors k_1, k_2, k_3 and k_4 . k_0 is merely a quality constant, which defines the Q_{OA} so that a value of $Q_{OA}=0$ corresponds to a volume hazardous to health. The values obtained experimentally and statistically for the preliminary factors can be referred to physical, i.e. objectively measurable, parameters—and so finally to the design of a heat pump and the fans installed in it. The usual starting points for noise reduction include air duct design, turbulence or inflows at the fan.

The tests show that, if we improve the Q_{OA} of a specific heat pump noise by the value 2 at a constant noise level, it is perceived as being as pleasant as having made it quieter by a total of 8 dB (A)! That is why a high Q_{OA} means a nicer time spent in your own garden, and a better relationship with the neighbors. ●



Dr. Marc Schneider is responsible for Pre-Development Aeroacoustics at ebm-papst.



If the psychoacoustic quality Q (y-axis) of a noise increases by the value 2 (green compared to the red curve), the sound may also be a whole 8 dB (A) louder (x-axis), and is nevertheless perceived as equally pleasant or equally as disruptive. Put in a different way: the higher Q is, the more pleasant and quieter the noise is perceived by humans.

From the tropics to the Arctic in 10 seconds

In our own testing center in Hollenbach, Erich Kemmer and his team send fans on a long and demanding field trip, exposing them to heat, ice formation, rain, and much more. Our customers are the ones who benefit most from these trips.



Erich Kemmer,
Group Leader Validation

It goes without saying that fans and their components, such as motors or impellers, are tested in-depth by ebm-papst during development and prior to market entry. But it matters how the qualification is done. “The life of a fan does not usually reflect laboratory conditions,” says Erich Kemmer, Group Leader Validation. The fan may experience ice formation, temperature changes, bumpy transportation or it can even fall if it is installed without care and things go badly. All of this should not reduce the service life—customers rely on their fans lasting.

“That is why we do not test our products under relaxed, nice laboratory conditions,” says Erich Kemmer. “Instead, we put them through environmental influences: real rain, real heat, real ice formation.” The aim of this more or less real journey around the world through different climate zones is testing alternating conditions passed between the environment and the fan. What impacts the device and how,

and may it lead to defects or even malfunctions?

To answer this question, the test center team works every day on an area of around 2,500 square meters and across six test bays. Sometimes they use standardized test sequences, and in some cases they use inhouse developed tests: This is where fans are properly rattled around on the “shaker,” impellers are extended to

maximum operating speed, or an air inlet grille is sprayed with salt spray. All this is done to detect possible weaknesses much faster than in the field. The point is for things to break sometimes: “If we could never bring a product to its limits, we would be doing something wrong. Things can and should break here,” says Erich Kemmer.

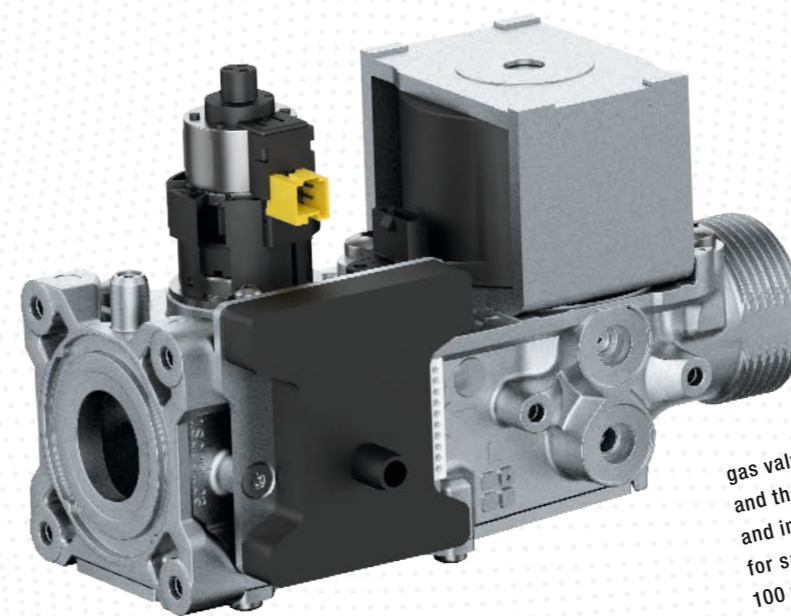
The arduous journey through all the test bays takes at least six months for one fan, a time full of hardship and effort. The good news is that customers can be sure that the fan they end up with them can easily withstand the toughest conditions. ●



LEARN ABOUT ALL THE TEST BAYS ONLINE:
mag.ebmpapst.com/validation

SQUARE POWER

The AxiForce 40 is the powerful solution to the challenges of electronics cooling. Thanks to the new motor concept, powerful electronics, a speed range of up to 27,000 rpm, and specially developed flow geometry, the small power fan, measuring 40 x 40 x 28 mm, is also easy to handle in confined installation situations and in high back pressures. It is extremely reliable, robust, and quiet during continuous operation.
ebmpapst.com/axiforce



GAS EXPERT

The combustion control system CleanEco Sense makes condensing technology fit for the future. The electronic pneumatic combination consisting of a gas blower, venturi, gas valve, and control unit always ensures an optimal air-fuel mixture and therefore efficient combustion. Thanks to the smart gas valve and intelligent sensors, the system is flexible to the max, allowing for safe operation with natural gas, biogas, and even with 100 percent hydrogen. The transition is possible at any time, without modification.
ebmpapst.com/heating

ELECTRONICS COOLING SPECIALIST

The AxiEco 200 is the expert in electronics cooling and data centers. The powerful compact fan was specially designed for applications requiring pressure and achieves around 9 percent greater air performance than conventional fans. The impeller has been optimized to the latest aerodynamic findings, has no tip gap, and therefore achieves greater efficiency with less noise. Thanks to its high-torque motor and high-performance electronics, it also enables efficient and fast system maintenance when the system is running.
ebmpapst.com/axieco200



»This is how the AxiEco fits perfectly in heat pumps«

The AxiEco conquers the heat pump market as a Plug-in.



Dominik Bork, a designer in peripherals development in Mulfingen, explains what it took for the evolution of the product range to become a success.



YOU CAN FIND MORE INFORMATION AT:
ebmpapst.com/axieco#plug-in

Mr. Bork, why did ebm-papst develop the AxiEco Plug-in?

We wanted to optimize our well-known product range so that it would also fit optimally in heat pumps. After all, heat pumps need reliable fans that convey air through the heat exchanger. Our AxiEco offers the perfect properties for this. So we have developed a special mounting with which the fan can be easily and precisely integrated into the heat pump circuit.

What makes the AxiEco so suitable for heat pumps?

Heat pumps are usually used outdoors. As a result, they should function reliably even in bad weather conditions, especially at low temperatures. After all, moist air freezes on the fins of the heat exchanger. This results in pressure loss and less air flows through it. In this case, the fan must compensate for the loss and operate under higher back pressure. The challenge is then continuing to deliver a consistently high air flow. Compared to other axial fans, the AxiEco can easily achieve this thanks to its design. It is also less susceptible to ice formation with its inlet ring and lack of air gap. In addition, the AxiEco operates very quietly even at a high back pressure. This is ideal for use in

heat pumps. After all, the systems also run in front of residential buildings. Here, loud fans would simply be too disruptive.

What is new about the Plug-in?

The most striking new feature is the combination of mounting and FlowGrid, and another is that it is made of plastic. This makes the AxiEco Plug-in a real lightweight in the product range and makes the axial fan easier to install as a plug-and-play solution with a number of screw-on points and the option of fitting heating tape. We have also placed the FlowGrid on the intake side. This prevents turbulence before the air flows through the fan.

Why is this important?

We have developed the AxiEco Plug-in specially for heat pumps with little space. So there may still be components upstream of the fan that swirl the intake air and make the fan noticeably more inefficient and louder. The FlowGrid prevents this by rectifying the incoming air. At the same time, the AxiEco Plug-in is very compact, as it has no mounting on the outlet side. This makes it even easier to fit into the tight installation space of the heat pump and it can play out its strengths in this application, no matter whether it is used for heating or cooling. •

Quieter than its predecessor by up to

5 dB(A)

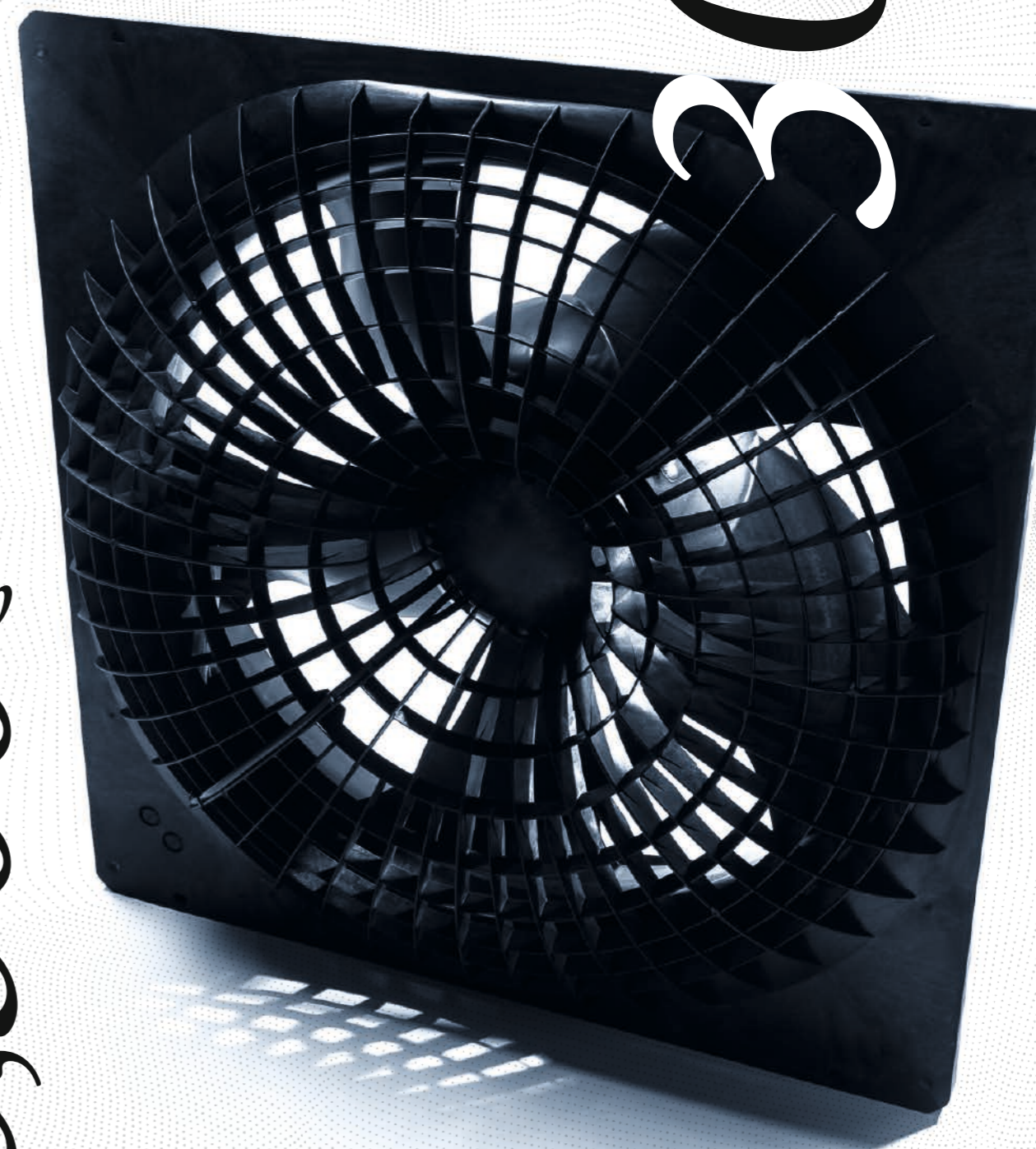
Lighter than the previous model by

30%

m³/h

5,500

maximum air flow



Up to

20%

 more efficient than the previous model