



Access granted!

The Gunnebo team understands gates.

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Dear readers,

Unfortunately the pandemic is not yet over, but we are hoping to see it come to a swift end in not too long. That is why it is high time to switch from taking a cautious approach to a confident one and concentrate firmly on the future. At ebm-papst, we have made efficient use of the enforced quiet period over this past year to get our organization in good order and to prepare ourselves for new tasks. One of our focal points has been our commitment to sustainable actions and energy efficiency, which is not really anything new. But we are approaching it in a new way, even more systematically: with a move away from AC technology (page 9).

Another focus is digitalization. We already laid important foundations a few years ago, but last year we took several significant steps forwards. We have turned our digital start-up, ebm-papst neo, into a GmbH, and thus fired the starting shot for developing new products and business models. Among other things, we place a strong focus on air quality. This is where our central competencies come together: moving air, linking the resulting data, analyzing it using intelligent software, and converting it into real added value for users—for better health, well-being, productivity, and efficiency (page 19).

But the right hardware still plays a crucial role. This is why we have set up a new laboratory for electromagnetic compatibility testing (page 36). This is another important step towards a new future—one that, from April, my esteemed colleague and CSO Thomas Nürnberger will be shaping together with you. I wish him every success and would like to thank you all for the great many exciting meetings and projects.



Stefan Brandl

—
CEO OF THE
EBM-PAPST GROUP



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The DiaForce diagonal compact fan

A striking wooden construction, gigantic glass panels, and copper stills raising their heads to the sky: for visitors to the **STAUNING WHISKY DESTILLERY** in Denmark, even the production building from outside is a sight to treasure. However, inside the distillery, it was becoming almost unbearably hot, especially in the summer. The reason for this was the combination of the large glass panels and the mash boiling in the copper stills. Fortunately, two ebm-papst AxiBlade axial fans have recently been installed and provide an effective solution. They cool the room down, and thanks to their sleek design and quiet operation, they neither distract from the overall impression nor bother the visitors. They are controlled automatically through the building technology, but can be controlled individually if necessary.





Clinical cleanliness can have a life-or-death impact. In cleanrooms, people have to handle highly toxic substances. **BLOCK**, a company based in the Czech town of Valašské Meziříčí, makes the isolators that provides these people with protection. The box with its glass pane and gloved openings forms a physical barrier between human and substance. But what if something goes wrong? The blower provides reassurance. It ensures there is a vacuum in the isolator. If any part of the barrier becomes permeable, air from the cleanroom flows into the isolator due to the lower air pressure inside it. Nothing can escape. The blower has to be quite powerful, and must not make a loud noise under any circumstances. Because, anyone working with toxic substances has to be able to concentrate. Fortunately, ebm-papst makes blowers that have speed-controlled EC motors. *Read the whole story at: mag.ebmpapst.com/block*





Cool on the way

Whether it's frozen pizza, vegetables, or the finest salmon, the Advancer trailer cooling system from Thermo King ensures that all food is fresh and delicious when it arrives at the supermarket. Driven by its own engine, it always keeps the goods in the trucks at the right temperature. When doing so, it operates almost a third more efficiently than the industry average. One reason for this is that the customer can adjust the cooling air flow of the evaporator precisely to their load and needs. Steplessly adjustable RadiCal DC fans from ebm-papst make this possible. They work independently of the combustion engine and therefore precisely cool any type of cargo. ●

Read the whole story at mag.ebmpapst.com/thermoking



»We are fully focused on producing sustainable products«

Stefan Brandl, CEO of the ebm-papst Group, on the decision to concentrate firmly on sustainability and move away from low-energy-efficient products.

ebm-papst has stood for sustainability for a long time, but now you are taking a new approach with “Sustainability Engineered.” What does this involve?

We are convinced that all of our company’s thinking and actions need to move towards sustainability. This applies to buildings, production, processes, and of course products. With GreenIntelligence, we have raised our GreenTech philosophy to the next level and upgraded it by leveraging the huge benefits that digitalization can offer. Smart products that work together by being connected open up the potential for greater energy efficiency than would be possible through purely structural measures. That is an important component of our “Sustainability Engineered” approach.

Could you name an example?

By using the fan as a data source and linking it to the Cloud, it is possible to optimize its operating condition using algorithms. For example, it runs on just the amount of power that is required at that particular moment. And we are going beyond that with ebm-papst neo: this enables us to measure operating conditions in buildings and network them with our platform via the Building Management System. In turn, we can improve the entire building better in terms of energy efficiency and air quality.



Stefan Brandl is CEO of the ebm-papst Group.

And what else does “Sustainability Engineered” include?

To go one step further: until now, we have been able to achieve a great deal with EC technology. But now is the time to firmly focus on these energy-saving products. That is why we are planning to reduce our AC product range and to use the resources that this move frees up for new technologies. And by 2030, ebm-papst wants to aim to do without AC technology in the European market entirely.

What was it that led to this step?

Sustainable business and resource conservation are part of our DNA. This has become an increasingly important topic over the past few years due to climate change and the resulting political initiatives. The coro-

navirus crisis has accelerated this process: we have used this period to organize ourselves. We want to rid our product portfolio of outdated products and weed out ones that are not sustainable.

What do customers think about this?

Of course, with this approach, we are putting pressure on our customers, as well. As some of them are still quite happy to continue using the existing technology. However, we have resolved to see this step through as the outdated technology no longer has any long-term prospects. At the latest, the next stage of the Energy-related Products Directive will provide evidence for this. That is why we have decided to focus resolutely on sustainable products. We want to move forward with conviction and actively shape the future—for and with our customers. ●

Nick Elkins at the metro fast lane in the showroom at the British Gunnebo site in Maresfield





COMPANY

Gunnebo Entrance Control

LOCATION

**Maresfield, Great Britain
Lavis, Italy**

Sure Thing!

Whether it's at airports, in office buildings or in metro stations, Gunnebo Entrance Control makes sure that only those who are allowed to get in do get in. Instead of muscular security guards, the company uses high technology to do this.

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Sometimes Iain Port can't help it. He just has to ask other passengers—complete strangers—what they thought of the security gate they just went through. “I usually get irritated looks when I ask,” says Gunnebo Entrance Control’s R&D and Operations Director, laughing. His colleague Nick Elkins also keeps his eyes open for gates around the world. “But I wouldn’t normally approach strangers to ask their opinion about our gates, I would typically just tell the person I’m with that they’re going through a Gunnebo product,” says the company’s Design Engineer New Product Development.

Both of them usually have a lot of opportunities to see their own security gates in action: Gunnebo, based in Göteborg, Sweden, has 5,800 employees spread across 31 countries. In normal times, business trips are commonplace.

Four countries, one project

The members of the Gunnebo team that has been working for the last couple of years to design a new security entrance gate are situated in various different parts of the global Gunnebo Entrance Control business unit. Port and Elkins work at the British Gunnebo site in Maresfield. The firmware developers Francisco Kedjagni and Daniele Zanini are based at the Gunnebo site in Lavis, Italy, and the production team based in China also played an important role. The global ebm-papst network also provided support.

The aim of the collaboration, which, before coronavirus, involved a lot of travel, was to optimize the performance of a Metro Fast Lane barrier (MFL), i.e. automatic ticket control gate, which can be found in many metro stations. Gunnebo usually develops complete gates, but this time the project involved redesigning the core component, the mechanism, which ensures that the swing doors open as quickly as possible when someone wants

to get through with a valid ticket and then closes shut equally as quickly before the next person, and that anybody without a valid ticket is stopped and prevented from passing.

The physics pose a problem

There are a number of challenges that must be overcome when designing a fast moving barrier. After all, they have to open and close very quickly, and there is a risk that it could make contact with a user whilst moving. Port explains: “The problem is the physics: The faster something moves, the more powerfully it can close on someone or something and potentially cause injury. But at Gunnebo we are committed to the safety of the user and therefore we need to find a way to move fast but with very low impact forces.” The experts from Gunnebo also have to provide a door that will stop people from

“The problem is the physics: The faster something moves, the more powerfully it can close on someone.”

IAIN PORT

R&D AND OPERATIONS DIRECTOR,
GUNNEBO ENTRANCE CONTROL



Wanted a new solution for motor control: firmware developers Francisco Kedjagni and Daniele Zanini

pushing through in normal operation but that will also release to allow crowds ‘push through’ in the case of panic, for example, “it must not become a blocking obstacle in an emergency,” says Elkins.

The Gunnebo team got support from Germany to outsmart the physics: market manager Stefan Rötzer and project engineer Dominik Häßler traveled from ebm-papst to Lavis many times. Because, as Francisco Kedjagni explains, “We have a number of existing products with really good performance but for this specific application we decided to work with ebm-papst to develop a new

solution because they are experts in motor control and exhibited a real desire to collaborate to find the best solution to this challenge.”

Slim, speedy, and smart

But what constitutes the best drive in this case? It needs to be slim and speedy, and also smart. The idea behind it is that, if the motor and transmission don’t require much space, the gate can be made slimmer. “The ebm-papst drive requires a third less space than its competitor product. At the same time,

it's significantly more efficient and, therefore, consumes less energy," Rötzer explains proudly. "This enables completely new approaches to designing the entire gate and meets the highest environmental standards." The smaller motor frees up space in the gate cabinet for other peripheral equipment to be fitted and also makes the overall package appear more slimline and aesthetically pleasing.

To ensure that the impact force from the gate was not too high, the project team not only worked on making it speedy, but also worked on making it smart: with the new drive, the doors complete a 90

degree swivel movement at the blink of an eye. If the doors meet an obstacle, the motor detects the impact immediately through the onboard controller and reacts according to the customer's preferred option: stop, reverse, or drive with low energy. "A clean bit of engineering work," praises design engineer Elkins.

With physical effort

He would know. He carried out some of the many tests that Gunnebo used to check the quality of the



Daniele Zanini was to find out how the motor, controller, gearbox, and firmware complement each other perfectly (left). So small and already so smart: the ebm-papst drive requires a third less space than comparable products and knows when to stop moving the doors.



“It was an exceptionally smooth process. It’s not usually so easy to get the drawings or the CAD models you need, for example.”

NICK ELKINS — DESIGN ENGINEER NEW PRODUCT DEVELOPMENT

drive and the interaction of the components: On a sturdy test stand, Elkins engaged his strength to test the push-through system design and evaluate the performance boundaries the swing gates would give. His Italian colleagues used the same physical effort to check the impact force of the gates using different motor/controller/gearbox/firmware combinations. Their laboratory houses complete gates that have been through a rigorous development and test process “and we have seen some very interesting results along the way,” says firmware developer Daniele Zanini.

The collaborative work on the MFL was not boring, even outside the laboratory: There was some time to relax together in the beautiful local surroundings at the end of long days of testing, enjoying the local restaurants in Lavis. But, with

the utmost respect, the men from Gunnebo were convinced by something else: “Working together we agreed on the best implementation of the drive control system and then spent a long time developing and refining it. There were many challenges to overcome throughout the process. But with support from Dominik and Stefan we achieved our main aim of having a low impact force, and a super fast and smooth motion,” says Zanini. Elkins agrees with him: “It was an exceptionally smooth process. It’s not usually so easy to get the drawings or the CAD models you need, for example.”

The optimized Gunnebo gate is due to be launched soon. So if someone asks you what you think of a security gate in future, just praise the speed and movement of the wings: it could be Iain Port, who would be very pleased. ●

(Left page)
Testing for secure passage: countless tests were carried out by design engineer Nick Elkins to find out when the doors give way.

COMPANY
Lochinvar

LOCATION
Lebanon (Tennessee), USA



A lot of power in a small space: The VG 145 gas blower helped Jennifer Russell complete her two boiler projects in a very short time.

“Time was a very important factor. We really needed a partner that can keep up with us.”

JENNIFER RUSSELL — PROGRAM MANAGER AT LOCHINVAR

Two for three

Dustin C. Wiggins and Jennifer Russell of water heating technology manufacturer Lochinvar needed to make three product lines more efficient in record time. However, the gas blower required to do so didn't yet exist. Well, unless you have strong partners!

Anyone who wants to build or maintain a lead in a race sometimes needs a burst of intensity. Jennifer Russell and Dustin C. Wiggins have provided this in the last two years. They are program managers for the water heating technology expert Lochinvar. They were tasked with making three product lines of condensing boilers and water heaters even more efficient but they didn't have a lot of time. The project got off the starting blocks at the beginning of 2018 and series production was to start in the spring of 2020.

It's not for nothing that the company, which is based in Lebanon, Tennessee in the USA, has the motto: "No one brings it all together like Lochinvar." Lochinvar knows that building a successful business is a marathon not a sprint. Over its hundred-year company history, the premium manufacturer of water heating technology solutions for commercial and residential applications has repeatedly succeeded in being one step ahead of the other market players with its innovations.

Increased power while maintaining the same size

Everything is a bit bigger in the USA compared with Europe. This applies equally to cars and buildings. This means that gas condensing boilers and water heaters have to provide more power. At the same time, environmental awareness among customers is increasing.

They were in for a real challenge. The products (which are overseen by both program managers) are used in com-

mercial applications such as hotels and restaurants. Wiggins says: "Everything depended on the blower. It was supposed to provide 20 percent more power, but without taking up more installation space than the predecessor." The next difficulty was that Lochinvar wanted a blower that would be suitable for all three product lines and their models. This type of blower didn't yet exist, though. Russell emphasizes: "Time was a very important factor. We really needed a partner that can keep up with us."

A partner that helps companies keep pace

Lochinvar has been working with ebm-papst for many years. "Our products start at an output of 16 kilowatts and can reach up to two megawatts. There's a bit of ebm-papst in all of them," says Russell. The partner had therefore been chosen, but the engineers in Landshut still had to develop the blower. Even though they were thousands of kilometers apart, it felt to the two program managers as though the developers were close by. Wiggins explains: "The blower had to have such a flexible design that it can be used to equip multiple product families. This is not so easy when you consider that we use different mixing devices throughout them. However, from the very beginning, we were closely involved in development and received prototypes in a very early phase, meaning we could incorporate our wishes."

One of these wishes was for no rare-earth magnets to be used. They are expensive and the supply is not always



“Everything depended on the blower. It needed to provide 20 percent more power, without taking up more space.”

DUSTIN C. WIGGINS

PROGRAM MANAGER
AT LOCHINVAR

Dustin C. Wiggins’ task was to get more power out of the Shield water heater. But it couldn’t get any bigger as a result.

reliable. Lochinvar does not want to take this kind of risk. ebm-papst can help here, too. Thanks to EC technology and the corresponding electronics, it is possible to implement powerful blower motors without relying on this resource.

Russell remembers this very intense time: “Dustin’s office is right next to mine. We worked on the projects at the same time and repeatedly bombarded ebm-papst with new requirements. We always had the feeling that they understood us and we always received responses very quickly. Our processes were a good fit with one another.”

Ready for the future

In the end, the two partners achieved what they wanted. The VG 145 blower designed for the US market was ready for operation in spring 2020. Production began in May in Tennessee. Russell and Wiggins now have the opportunity to catch their breath. The boilers and water heaters are now on the market and it looks as though the company will be able to maintain the lead for a while that the two product managers have provided. Wiggins: “We will consider the VG 145 for future projects, because of its flexibility.” ●

Seema Bhangar wrote her thesis on human exposure to air pollution at the University of California in Berkeley, developed the next generation of indoor sensors when working at Aclima as a Senior Scientist and Product Manager, and has worked as Senior Indoor Quality Manager at WeWork in San Francisco since 2019.



Here, she is currently driving forward the use of new technologies to improve health and productivity, and the energy efficiency of buildings. In this article she is speaking as an independent expert, not as an official ambassador for WeWork.

» *Handle air smarter!* «

The quality of the air that we breathe directly influences health, productivity, and well-being. Despite this, it remains a niche topic. Seema Bhangar and Raefer Wallis, who are experts on the matter, think it is high time for this to change.

Raefer Wallis is an architect and has been working on the topic of air quality monitoring for 15 years.



Over the past ten years, he has defined air quality standards which have now been incorporated into the international air standard RESET, of which he is also the founder and CEO.

THESE ARE FOUR BASIC PRINCIPLES FOR GOOD AIR QUALITY INDOORS

*Minimize
indoor
emissions*

*Provide
good
ventilation*

*Keep
buildings
dry*

*Keep
polluted
air out*

H

How much water have you already drunk today? Assuming that you follow the relevant recommendations, this should be up to three liters a day. In turn, three liters of air flow through your lungs in just 20 seconds. In 24 hours, humans breathe 15,000 liters of air. Given this situation, it is surprising how little we concern ourselves with the issue of air quality in comparison to the quality of drinking water—at least as long as the air doesn't smell. For example, if the air in a room is polluted with formaldehyde given off by furniture, then

those affected will act accordingly because they can smell it.

Air quality is invisible

“The greatest obstacle to a greater awareness of air quality must surely be that we can't see it,” says Dr. Seema Bhangar, explaining the psychological background. At the University of California in Berkeley, Bhangar wrote a thesis on human exposure to air pollution. “But Covid-19 has lifted the veil of invis-

ibility from the issue of air quality: although the virus isn't visible in a physical sense, it is visible in our imagination." This example emphasizes that the priority must, first and foremost, be to raise awareness of the issue.

Raefer Wallis, founder and CEO of RESET, the world's first standard for air quality based on real time data, is in agreement: "In Western countries, there is only a low awareness of air quality. Here, the notion is that it's a problem for people in far-away countries—like China or India. But this attitude has been completely altered by SARS-CoV-2 and has outlined the complexity of the matter."

However, you don't need a dangerous virus to substantiate the negative effects of poor air on indoor spaces. An additional 35 micrograms of fine dust per cubic meter of air increases the risk of a stroke by 35 percent, and the risk of suffering from lung cancer by 10 percent. Admittedly, these kinds of long-term effects are quite abstract. But there are also more immediate tangible effects: for example, if the CO₂ content is elevated by 400 ppm, it can reduce productivity by up to 21 percent. A ratio that should make any employer sit up and take notice.

Setting the right benchmark

There are a number of factors that affect indoor air quality: climatic conditions such as temperature and humidity, the environmental conditions outside, the number of people in the room, the furniture, technical equipment, and the building construction materials. "When it comes to energy, it's easy to set a benchmark: you measure the consumption value and then you set a target to reduce this value. Air quality is a much more complex issue, and there are many different benchmarks," says Bhangar, outlining the difficulty in finding the right approach. "That's why almost every company has an energy manager, but hardly any of them have an air quality manager." She refers to a framework with four basic principles for good air quality indoors presented by her former supervisor Bill Nazaroff, to make the subject matter easy to access. These are: *Minimize indoor emissions—Keep buildings dry—Provide good ventilation—Keep polluted air out.*

Turning knowledge into actions

These principles need to be translated into efficient actions. But that requires the right tools. "Technology has evolved at an incredibly rapid pace over the past few years," says Bhangar, on the subject of solutions. "The possibility of measuring, digitalizing, processing, and visualizing things has arrived."

Welcome to the world of Raefer Wallis. For 15 years, the qualified architect has been working on indoor air quality standards, and from his work has developed the international RESET standard. "Air quality is not a do-it-yourself issue. It's far too complex for that." He explains that there are so many different variables, some of which are actually contradictory—for example, how do you ventilate a room properly if the air outside is polluted? In this case, solutions implemented without being rooted in data might not be very effective. In Western countries especially, monitoring air quality indoors is largely done through "guesstimating," i.e. using a broad rule of thumb guideline. "It's like a doctor who prescribes a treatment without being able to make a reliable diagnosis."

Wallis is therefore in favor of intelligent, automated systems—which he also applies himself. "Most people don't know that suitable technology has been around for a long time." RESET uses the data recorded from sensors mounted on the walls or installed in the ventilation system. This is an area in which Wallis also works with ebm-papst, who offer not only fans with certified sensors, but also a platform for processing the data. With the sensor data, the air quality can be analyzed in real time and subsequently optimized with the help of the platform. Wallis says that anyone fearing having to make a major investment for this technology can rest assured: "The devices that we work with came onto the market in 2008 and have been designed as smart solutions since 2016. They are now sophisticated, quick to install, and cost-effective."

Seema Bhangar emphasizes that it is not primarily about money: "It's about making things smarter: take a look at the whole picture, and improve what you already have with this knowledge." ●

COMPANY
RATIONAL AG

LOCATION
Landsberg am Lech, Germany



Anything but half-baked

With a new generation of combination ovens, RATIONAL is setting a new industry standard, partly thanks to intensive consultations with partner ebm-papst.

With some 1,300 exhibitors from around 25 countries and approximately 95,000 visitors, the Internorga is a special event in the German gastronomy trade fair calendar. In normal circumstances, cooking systems manufacturer RATIONAL would have presented its new products to gastronomers from far and wide in 2020, who would

have eagerly awaited to see what new products might make their lives that little bit easier. And in normal circumstances, the order book would already be looking nice and full after the three-day event. But this past year has been anything but normal. Due to the coronavirus pandemic, the trade fair had to be canceled and RATIONAL was

Not just a real advantage in the hotel business:

The iCombi Pro can cook various dishes across several levels to the exact desired cooking point.

forced to present its new generation of combination steamers online. And so, a few weeks later than planned, RATIONAL introduced its latest generation of iCombi Pro devices online to the general public—and some of the feedback was nothing short of exuberant: “What an exceptional device. It’s what all chefs dream about,” was a response. Or: “When is it being launched to market? I’d like to reserve one or two right now!” Others pointed out how RATIONAL never ceases to improve its products and that it had a status akin to that of Apple. The presentation, given via a YouTube video, made sure not to leave any questions unanswered: with the new iCombi Pro, food can be cooked to the exact desired cooking point—no matter on which level of the oven. You can even cook a combination of dishes at the same time: for example, salmon at the top, roasted vegetables in the middle, and chicken breast at the bottom. The device’s smart technology regulates aspects such as the temperature, steam inlet, and cooking times for the selected cooking process. The user controls the cooking process via a simple touch pad, which displays all of the parameters.

Customer-centric approach

“For us, technology is just the means to an end—and it is the benefits of the device that are always front and center of our work,” says Michael Schmidt, Strategic Buyer at RATIONAL. Customers, including internationally renowned brands want greater capacity and more convenience in operation. Consequently, the new iCombi Pro can take up to 20 trays, enabling chefs to cook, for example, between 250 and 300 steaks simultaneously. A special assistant can even make suggestions as to how to load the trays, to save time or energy for example. “With our devices, you don’t have to know every step in the program. You just state what the result should be, and the device will do the rest,” says Schmidt.

Good partnership

RATIONAL once again approached its long-standing partner ebm-papst during the development of its new iCombi Pro generation. The requirements specification stipulated the need for up to three (instead of the usual two) high-efficiency motors for the drive of the fan impellers, with the additional requirement for the motor electronics to be easy to replace.

However, the amount of installation space available for all remaining components was to remain the same. Thus, the matter of installation space became the hardest nut to crack for ebm-papst. “There was very little space in these devices before,” says Alexander Remmele, Key Account Manager for Sales at ebm-papst in Landshut. “And with the new generation, we were going to have to take the

depth of integration to a new level.” A total of 13 ebm-papst employees working across three sites were enlisted to address this challenge. Although nothing could be done about the number of motors and gas blowers, the architecture could be tweaked. “We developed an integrated housing for the blowers and gas valves and used our existing platforms for this purpose,” says Remmele.

Making space where there is none

The developers at ebm-papst Heating Systems in the Netherlands maximized the space they gained by using combustion controllers. This type of controller actuates the blowers and valves and monitors the combustion process. “For the new series, we were able to increase the functionality of the machines, thus reducing them from one or two per device to just one,” says Remmele. This gave the experts a bit more breathing space, in the proverbial sense, so their colleagues in Mulfingen were able to focus on the matter of the motors. In order to make the additional motor more maintenance-free, the electronics that are usually installed inside the motor were relocated to behind the drive, where, under a cover attached with four screws, it is more easily accessible. This makes the maintenance process much faster, as it is not necessary to replace the entire motor in the end device.

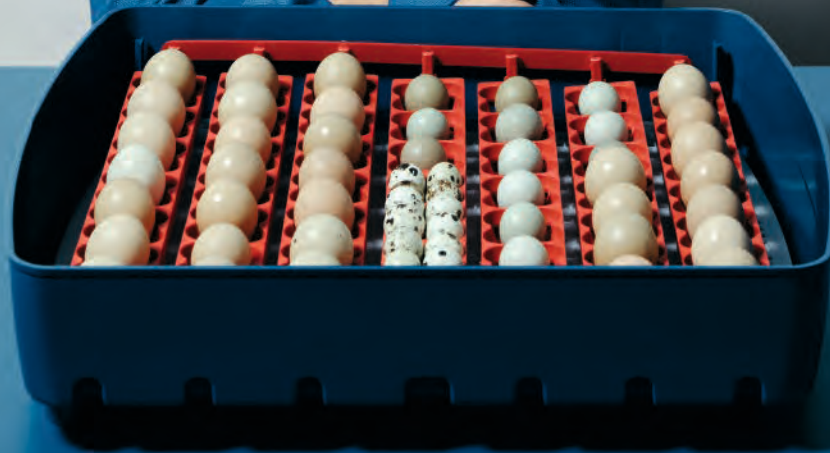
New, better, evenly cooked

The development of the new iCombi Pro generation was a challenging project for ebm-papst. “From a technical stance, things got very deep,” recalls Alexander Remmele. “That’s why we agreed to have meetings with RATIONAL on a four-weekly basis for the entire duration of the project.” The meetings took place alternately in Mulfingen or at the headquarters of RATIONAL AG in Landsberg. RATIONAL AG was very happy with the project. “The collaboration went brilliantly,” says Michael Schmidt. “In terms of the gas blowers, ebm-papst supplied a system that houses the gas and air modulation system, gas valve, and venturi in one. This is more cost-effective for us and makes installation much easier because all the necessary hose connections are already integrated. There was also a significant improvement in terms of the motor. Now, where we no longer have to remove the entire motor and impeller in the event of a malfunction, maintenance is much easier. After all, most faults came from the electronics, and the removal of the motor would otherwise damage the impeller,” explains Schmidt.

The result of this collaboration is more than impressive: a new, more powerful device generation that is also more maintenance-free. There is nothing half-baked about that! ●

Better than any hen

Incubators for
hobby breeders are
Andrea Borotto's
great passion.



COMPANY

Incubatrici Borotto

LOCATION

Buttapietra, Italy

The Italian company Borotto manufactures incubators for people who want to raise hens, ducks, or other birds as a hobby. ebm-papst's technology helps to ensure that healthy and happy chicks can hatch.

Andrea Borotto has a passion: raising hens. It is one that runs in the family. He is the third generation of chicken enthusiasts in his family. But as passion alone wasn't enough to make a living from, he made it a career. He became a salesman and started selling incubators to others who also keep a few birds as a hobby. However, his customers were not entirely happy. He kept receiving feedback about one shortcoming or another. So, Andrea decided to build the units himself. "I wanted to design professional appliances that are still affordable for private households," he says. In 2008, he thus founded his own company in Buttapietra, south of Verona.

Maintaining warmth and moisture

Andrea's devices are more reliable than any hen. Because hens do not always brood (sit on their eggs) as much as necessary, chicks do not always hatch. It takes around 21 days, and Andrea knows exactly what it takes to make this undertaking successful: "For the first 18 days, there must be a constant temperature of 37.7 degrees Celsius, at 40 to 50 percent humidity. Then the hatching phase begins, where 60 to 65 percent humidity is required. To ensure that the same conditions are present throughout the incubator, a

A

fan distributes the air evenly." In addition, the eggs have to be moved again and again, or the embryos will die. This is why Andrea has integrated a kind of tilt mechanism into his units, which tilts the eggs 45 degrees from left to right every hour. Once the chicks hatch, they remain in the incubator for a few hours to dry, before going outside.

Andrea offers several versions of the incubators, from a small one for eight eggs, to larger ones that can hold 49. The specialist also includes larger incubators for up to 900 eggs, for the professional sector, in his product range. More than just chickens can be hatched in these incubators. Other birds which could peck their way into the world for the first time in them include guinea fowl, ducks, pheasants, and even exotic species such as parrots. His business is buzzing, and he is also finding an increasing number of buyers outside Italy. "It's like the microwave at the beginning of the 1980s. Nobody needed them, but then everybody suddenly had one." He adds that the fact that his incubators are made in Italy was also received positively by his customer base.

In 2018, Andrea decided that it was time to start selling to the US and Canadian markets, too. However, he did not have the required UL certificate. Every part of his incubators had to meet the American safety certifier's require-

ments, or he would not have permission to sell them there. The problem was that his fan supplier did not have the certificate. So he started looking for a new supplier who would be able to offer the UL certificate. That's when he found what he was looking for and sent us an email.

An email that got results

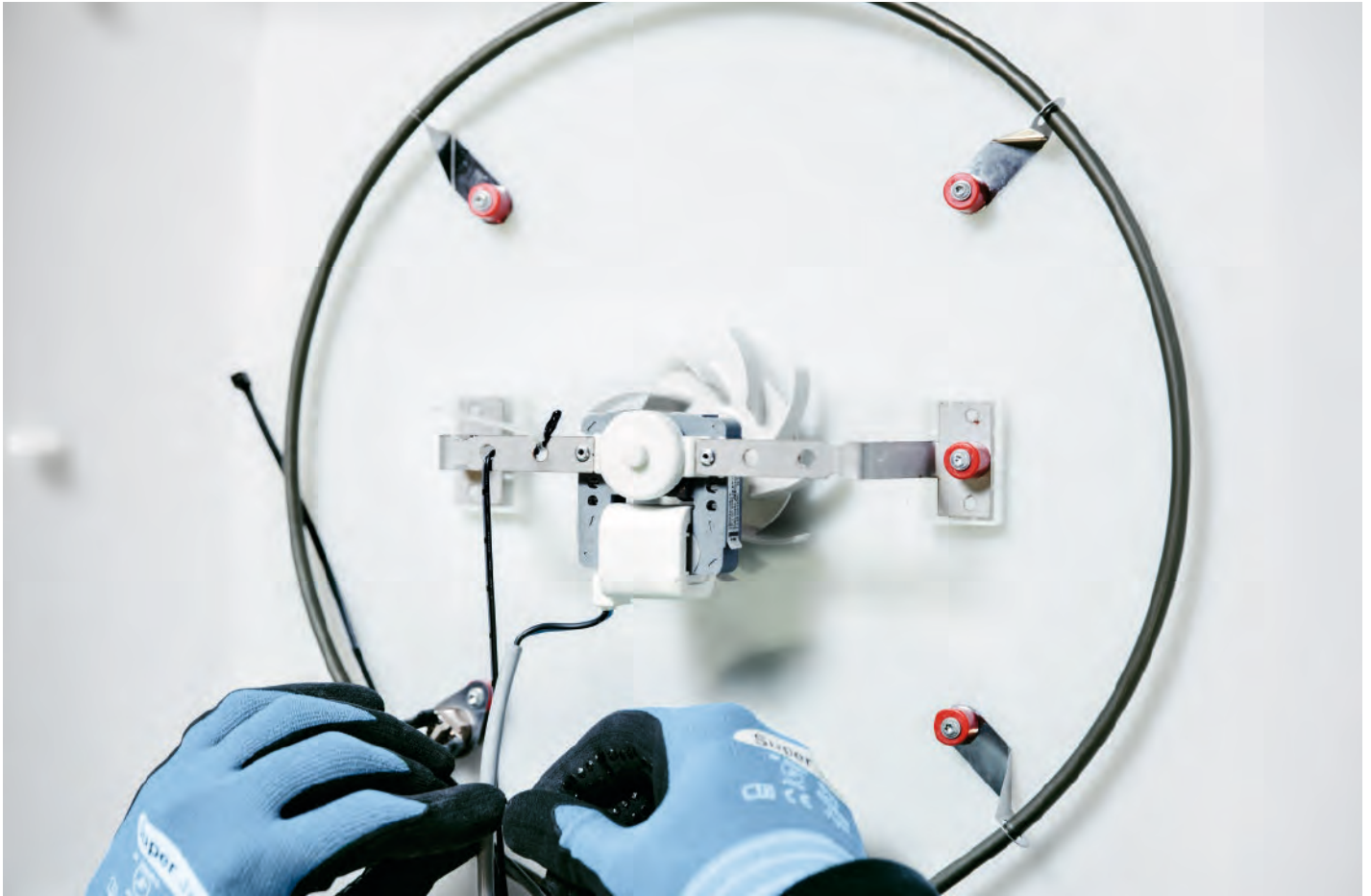
When Pierantonio Banfi from technical sales at ebm-papst Italy read the email, his curiosity was piqued straight away. Normally, he sold products that met those requirements to manufacturers of household appliances. The UL certificate was not a hurdle. Since ebm-papst's customers sell all over the world, almost all fans have this certification anyway. But incubators? He went to Buttapietra to get an impression on site. There, he learned how important it was for the motor to be as light as possible, and that ideally, it should not transmit vibrations, as they could harm the embryos. "When I saw the design of the incubator, I saw right away that we could offer a better solution," says Pierantonio. He thought about the fan impellers and motors that ebm-papst designed for ovens and refrigerators. But would it be possible to use them for incubators as they were?

He contacted ebm-papst's site in Landshut. There, Hans-Jürgen Withopf, Product Manager in the Home Appliance Industry department, was able to help. Incubators were new territory for this expert, too. But of course, he knew the key aspects to consider to ensure even air distribution. "An even temperature is important for ovens and refrigerators, as well. But when it comes to sensitive areas in particular, such as medical applications or laboratory equipment, it becomes essential. So in those applications, the fan has to work especially reliably." This is the case in Borotto's incubators, too, which also only offer limited space for the fan impeller. "That's similar too in fridges!" So Hans-Jürgen suggested a fan impeller like the ones commonly used in freezer cabinets. Another advantage is that the blades are curved backwards to better dissipate particles. These can occur when the chicks break through the egg shell, for example.

For the motor, Hans-Jürgen decided on a solution that suited the requirements perfectly. It should be durable and robust, and should withstand the warm and humid conditions. "Our motors are ideal for this. What's more, they are also very quiet, and produce hardly any vibrations." The motor and fan impeller are perfectly attuned to each other, so the current consumption remains low. The motor



Andrea Borotto in his production facility. The next project for a larger machine is already being planned.



Homogeneous air distribution within the incubators is crucial for their quality.

“I was impressed by the professionalism. If somebody just wants to sell me something, I don’t want to know. But if you can help me solve my problems, I’m all ears.”

ANDREA BOROTTO

—
MANAGING DIRECTOR OF INCUBATRICI BOROTTO

winding transmits almost no heat, so that the sensitive temperature balance is not thrown out of kilter. Pierantonio from ebm-papst Italy therefore had a tailor-made solution to take back to Buttapietra.

The incubators conquer the world

Andrea is completely satisfied. Now, he can sell his incubators in the USA and Canada. And he has also decided to use ebm-papst products for his existing devices in other markets. “I was impressed by the professionalism,” says Andrea. “I have 42 suppliers, and there are a lot of competitors. If somebody just wants to sell me something, I don’t want to know. But if you can help me solve my problems, I’m all ears. And that was the case at ebm-papst.” The business prospects are rosy: In 2019 Borotto sold 4,800 incubators with ebm-papst technology; in 2020 it was 8,000, and a figure of around 16,000 is anticipated for 2021. The next project with ebm-papst is already in the planning stages: “For professional machines for up to 900 eggs, they suggested that I try using tangential fans.” ●

COMPANY
Jacir

LOCATION
Pontault-Combault, France

Silence, s'il vous plaît!

Paris' La Défense, with its many high-rise offices, is the largest business district in Europe. It's a place that should be buzzing with activity — and not with the noise of cooling units. Luckily, the cooling tower experts at Jacir are on hand to help.

A new day dawns in La Défense. The first tired employees emerge from Line 1 of the Paris Metro, and the skyscrapers of La Défense awaken, bright lights coming on one by one behind the glass façades. But the cooling tower manufacturer Jacir has already completed much of its work on this January night in 2019. On Jacir's orders, heavy goods vehicles had crawled through the empty streets in the early hours—twelve stainless steel boxes, each 7.6 to 7.7 meters, were unloaded in front of a building that resembles an upside-down mushroom: the heart of Enertherm, responsible for all the hot and cold running water in La Défense.

Enertherm is responsible for heating the homes and workplaces of hundreds of thousands of people to a suitable temperature. The company uses a piping system to provide cold water for air-conditioning and warm water for heating directly to the buildings. But first, there were problems to solve. The cooling towers in Enertherm's

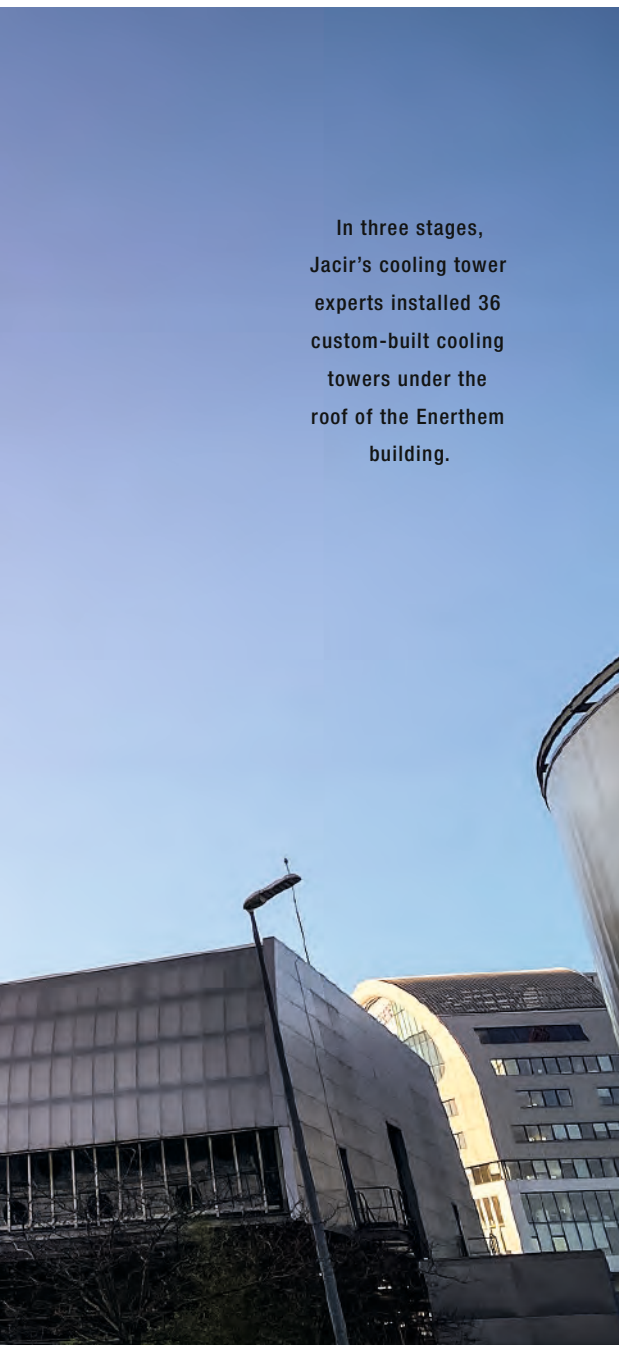
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production plant were past their best. They are used to cool the condensers that conduct the heat from the water. Enertherm had to contend with leaks, and maintenance was complicated. And then there was the noise—the nearest residential and commercial buildings are only 50 meters from the plant, which was too close for the level of noise that the old towers made.

36 custom-made cooling towers

This is where Jacir really impressed. The cooling tower experts are based in Pontault-Combault in the south-east of Paris and won the tender to deliver Enertherm 36 custom-made cooling towers, to be installed under the roof of the Enertherm building in three stages. To Antoine Robichon, Jacir's Technical Director, it is clear what made the difference. "For Enertherm, it wasn't the price that was key—as

In three stages, Jacir's cooling tower experts installed 36 custom-built cooling towers under the roof of the Enerthem building.



we weren't cheaper than the competition—it was how quiet our product is. On paper, our strongest competitor's system was equally quiet, but ours delivers in practice. ebm-papst's calculations proved to be absolutely correct." If you stand 20 meters away from the Jacir cooling towers, you'll be exposed to a volume of 37 dB(A). That's less than a TV in your living room playing at a normal volume. Each cooling tower contains nine fans, which generate an air flow of 270,000 m³/h. "We chose ebm-papst's RadiPac centrifugal fans, as they were the only ones that could meet the requirements," says Robichon.

324 fans

Apart from the low noise level, the two main requirements were energy efficiency and being wear free: The fans have a wide optimum efficiency range, with a static overall efficiency of up to 68 percent. The EC external rotor motors of the centrifugal fans with 100 per-

cent speed control do not require maintenance thanks to the long-term lubrication of the ball bearings. With the new cooling towers, Enerthem can achieve a total cooling capacity of 129 megawatts. In total, Jacir installed 324 RadiPac fans with a size of 1,000 mm in the cooling towers for Enerthem. The project was divided into three deliveries, each of twelve towers that Jacir had to install on the roof of the Enerthem building at a height of five meters—which was no easy undertaking, and a real organizational effort: "The heavy goods vehicles were only allowed to operate at night, while the 1,000-ton crane was only able to work in the day. What's more, the crane driver couldn't see what was happening at the end of the 100-meter-long arm," Robichon explains.

But the positioning of the cooling towers worked out—and strengthened Jacir's position in the market at the same time: "It was an important project for us. We will keep making use of the newly developed technical possibilities in the future," says Robichon. ●

COMPANY

Ordemilk Ltda

LOCATION

Treze Tílias, Brasil

When cows are happy, they produce more milk. The Farm Vale do Jotuva in southern Brazil works according to this simple principle. Ordemilk uses ebm-papst fans to ensure the perfect climate in the new high-tech barn.



Microclimate for the High-Tech Barn

The pride in Robin Vink's voice is unmistakable when he talks about his business in the state of Paraná, Brazil—a business which he heads together with his brother-in-law Johannes Arthur Van Der Meer: “Some 53 years after the company was founded, we now employ 32 individuals, and produce more than 30,000 liters of milk per day. Apart from the figures themselves, the way we do this has always been important to us.” The company generates around 60 percent of the energy it requires from a biogas plant, and also makes sure that efficiency and animal well-being go hand in hand when it comes to looking after their livestock. Vink also had

this principle in mind when he began planning the new barn. The barn should not just be any old building, rather a state-of-the-art freestall barn that provides the dairy cows with more space to move freely, and an optimized and comfortable environment. “It’s clear that modern technology can help us to keep improving livestock farming,” says Vink. “In this project, our most important objectives were to make optimum use of the space, keep the energy consumption of the new building as low as possible, and to increase milk production per animal in terms of time. The latter is best achieved when the animals are happy and healthy?”

Robin Vink (left page) runs the business and its 32 employees together with his brother-in-law Johannes Arthur Van der Meer.

Whatever the weather: the animals always have optimum climatic conditions in the barn.



The animals have plenty of space to move about in the barn, as well as the perfect climate.



80 axial fans with guard grills and diffusers ensure the necessary exchange of air.

Experts in air-conditioning for barns

Vink brought the company Ordemilk on board to implement the project. He had worked with Ordemilk, a company that specializes in automation and air-conditioning solutions in agriculture, before, and had good experiences with them. The Ordemilk engineering team explains: “For a project of this size, it is important to install reliable and efficient components. Our partnership with ebm-papst enables us to optimally meet this requirement when it comes to the fans.”

For the freestall barn, Ordemilk suggested a modern barn air-conditioning system with 80 EC axial fans with guard grills, and a diffuser, all from ebm-papst. These ensure efficient air flow that can easily be controlled, as the Ordemilk engineers explain: “Depending on the outside temperature and the layout of the barn, the fans can be individually controlled in a targeted manner. This is possible using a central control system.” The communication channel between the fans and the control system is the MODBUS interface that ebm-papst products are equipped with. It is not only possible to actuate the fans, but their exact state can also be transmitted to the control system.

In addition to monitoring the air flow, sensors in the barn also record other factors such as the humidity and ammonia content of the air. This results in a comprehensive picture of the microclimate in the barn, which the farmer can react to at any time. After all, they can view all the parameters together on a dashboard using a smartphone app.

A good climate all round

Robin Vink immediately saw the benefits of this solution, so Ordemilk received the order to install the air-conditioning in the barn as planned. After several months of construction, 800 cows now live in the freestall barn and enjoy an optimum temperature of 18 degrees Celsius all year round. As planned, their milk output has increased considerably. Vink is completely satisfied with his new barn: “The cost-benefit ratio is excellent. The solution was not the cheapest that we were offered, but after a year of using it, I can safely say that it has proven to be the right option in terms of technology, and is also the most energy efficient.” ●



“The cost-benefit ratio is excellent. The solution has proven

to be the right option in terms of technology and efficiency.”

ROBIN VINK

—
MANAGING DIRECTOR
FAZENDA VALE DO JOTUVA



The Vale do Jotuva farm strongly believes that animal welfare and efficiency go hand in hand.

Sensors in the stables measure the temperature, humidity, and ammonia content of the air.



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$$\eta_{\text{fan}} \neq \eta_{\text{max control electronics}} \times \eta_{\text{max motor}} \times \eta_{\text{max impeller}}$$

If you want to compare the energy efficiency η of various fans, you should consider the entire fan, i.e. the fan system, and not just its individual parts.

Anyone wanting to purchase a fan system asks themselves two questions: 1. Which fan will be up to the task? 2. Which fan will be up to the task with the greatest efficiency? The second question is about finding a fan that will provide the best efficiency (η).

In essence, a fan system consists of three main components: the motor, control electronics, and impeller. The efficiency of each component can be described by the respective individual efficiency level. It is usually specified in terms of the optimum operating range (i.e. η_{max}) by the manufacturers of these individual components. If the fan is assembled from the individual components mentioned, the individual efficiency levels are normally multiplied and documented. However, this can only be a theoretical overall efficiency that cannot be achieved later in operation. Why is that?

The efficiency describes the ratio of effort to benefit. In the case of the fan, the benefit is that it moves a volume of air against a resistance (pressure), i.e. the air performance in watts. This is calculated by multiplying the air flow (in cubic meters per second) by the pressure (in Pascal). The effort is the electrical power consumption, also specified in watts. The result is always <1 , as energy is always lost. Now you have a value for the level of efficiency, for example $\eta = 0.8$.

This would appear to be an objective value that can be used to compare the efficiency levels of different fan systems. Unfortunately, this is not always the case.

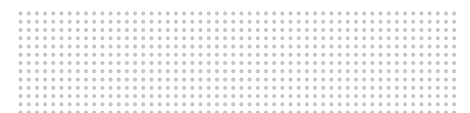
The crucial factor is how η came about. The question must then be: has the efficiency of the fan system been calculated or measured? There is a theoretical optimum efficiency level, and the efficiency level resulting from actual operation. The optimum η is always higher (i.e. better) than the measured value—sometimes by 20 percentage points! That is why many manufacturers prefer to specify the optimum η .

But this is not useful for the application, as it cannot be assumed that all three components will run at their optimum efficiency at the desired operating point. The deviations are often considerable. A fan system has a separate overall level of efficiency in each operating state, which is very difficult to calculate if using the individual efficiency levels of the components. It is better to measure the fan system as a complete unit.

When specifying the individual efficiency level of the impeller, there is also the additional particularity that, in the calculation, often total pressure increase is used, i.e. the sum of static and dynamic pressure. However, only the static pressure is relevant for a ventilation system. In this way, $\eta_{\text{max impeller}}$ is often inadmissably calculated to appear better than it actually is.



Uwe Sigloch, Director of Product Management at ebm-papst in Muldingen



At ebm-papst, we follow the Wire2Air approach. We only state actual, measured efficiency levels. In any case, we recommend attaching less importance to the efficiency level. In practice, it is much more informative to compare the expected power consumption for a specific air-movement task. ●

In-house EMC

ebm-papst is now testing the electromagnetic compatibility of its products itself at its new laboratory center in Mulfingen. This saves time and money and has another advantage.

ebm-papst invested 12 million euros in its new testing center for electromagnetic compatibility (EMC) at its headquarters in Mulfingen. Although the construction of the 5,000-square meter building had its challenges, the 25-meter tall structure was completed within the planned construction period, and testing operations began recently. Test specimens of up to 60 cubic meters in size and with a weight of up to 3.5 metric tons are tested here. Across a total of 13 different chambers, the engineers measure how well they react to disturbances and whether they could cause electrical or electromagnetic interference to other devices themselves. In addition to the test chambers and test halls, there are offices, complex energy-saving building technology systems, and plenty of safety precautions spread over three floors.

Everything in-house

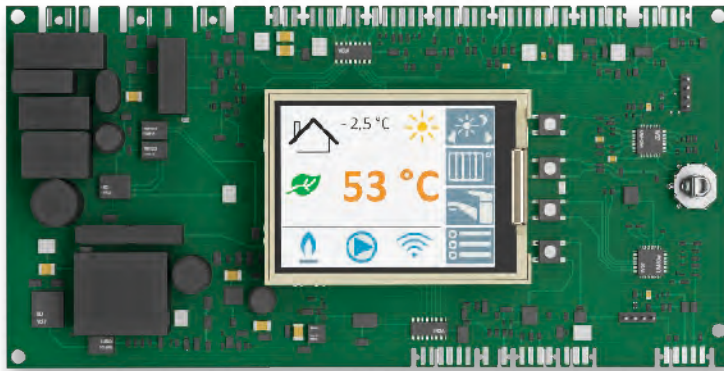
Martin Schmitt, Head of Electronics Services, explains the advantages of having an in-house EMC test center: "We can use it to measure our fans here on site according to all the relevant EMC standards and no longer have to resort to external laboratories. Com-



Markus Mettler and Martin Schmitt inspect a test chamber.

bined with the expertise of our internal EMC experts, we save time, can be as flexible as possible, and increase our reaction speed. Furthermore, the systems already offer the option of conducting EMC measurements on our customers' end devices under actual operating conditions."

Even for the construction of the building, ebm-papst relied on in-house resources. "We managed the project ourselves together with our architectural firm, which enabled us to streamline the process and ultimately save time and money," said Markus Mettler, Technical Operations Manager at ebm-papst and responsible for the construction. Being able to dispense with using a general contractor made it possible to adapt the planning parallel to construction. Mettler: "During the weekly construction meetings with the planning team, changes were made that would have had an effect on the price and construction time quoted by a general contractor." It was a wise move for ebm-papst to appoint local companies with the construction of the EMC test center: they have their own personnel and rely much less on subcontractors, who would not have been able to travel during the coronavirus crisis, as some international borders were closed. ●



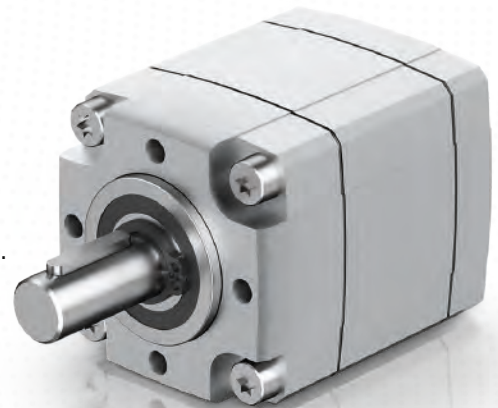
TURNING UP THE HEAT WITH DOUBLE INNOVATION

Two new control systems for combustion control contribute to the clean heat of the future. The CleanEco pneumatic composite system provides the optimum gas-air mixture for condensing units—with modulation levels of up to 1:10. The boiler therefore only ever covers the actual required amount. The electronic CleanVario gas and air modulation system adapts the level of gas accordingly, which means it can accurately control the efficient combustion process, even in different operating conditions and with different fuels.

ebmpapst.com/cleaneco

COMPLETE WITH OVERLOAD CAPACITY

The Optimax 42 is THE planetary gear to use for special requirements. Thanks to its large effective diameter, it can cope with overloads. In addition, the planetary gear for size 42 millimeter motors is extremely robust, comes with protection class IP54 as standard, and is available in one-stage and two-stage versions.



SQUEAKY CLEAN

Filter-fan-units (FFU) with RadiCal EC centrifugal fans easily meet the special requirements for use in cleanrooms. These requirements include sufficient air throughput and pressure, precise control of temperature and humidity, as well as a constant air purity achieved by filtering out even the smallest impurities.

ebmpapst.com/cleanroom

» Axial and centrifugal in one fan «

The DiaForce
diagonal
compact fan is
revolutionizing
electronics
cooling.



Christian Stern,
Product Manager
at ebm-papst
in St. Georgen,
reveals why
this is.

Mr. Stern, why is there a need for a new compact fan for electronics cooling?

Data volumes are constantly increasing in telecommunications and automation technology. Cooling these powerful electronics systems is becoming a real challenge, as the number of axial compact fans cannot be easily increased. This is due to the little available installation space and the noise protection requirements.

How did you solve this problem?

We combined our international development expertise to come up with a new approach. The close collaboration between our Mulfingen, St. Georgen and Shanghai sites resulted in the design and development of a new diagonal compact fan, one that meets future requirements and has the same dimensions as a conventional solution: the DiaForce.

What is new about the DiaForce?

In terms of its characteristics, it is a hybrid between an axial and a centrifugal fan. To achieve this, we fitted the fan impeller with a conical cover plate that surrounds the ends of the blade. There is no longer a tip gap which would lead to a drop in pressure and turbulence at the edge. As the outlet opening of the fan impeller is larger than the intake opening, the air flows through the fan in both an axial and a radial direction.

What are the benefits of that?

This design ensures a high pressure increase. It also enables much lower noise levels. Thanks to the aerodynamic optimizations, the DiaForce is six dB(A) quieter than a conventional axial compact fan—with up to 50 percent higher air performance. The axial design, which is cheaper for installation, is retained nevertheless.

What role does the motor play in this increase in performance?

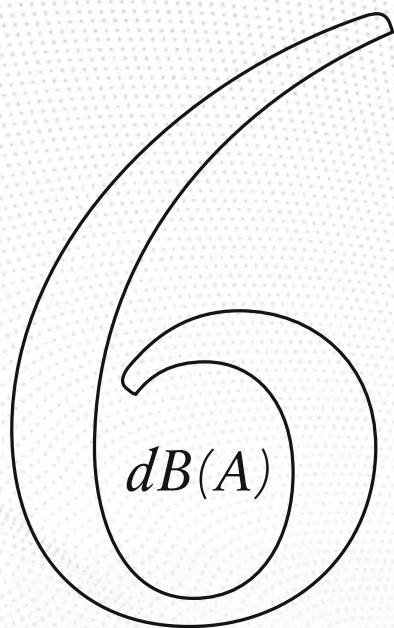
The EC motor with an output of 500 watts is very compact and operates at a high level of efficiency. Its electronics make a major contribution to this: a high-performance microcontroller operates a field-oriented control system that ensures the maximum possible torque in all load ranges and also optimizes efficiency and structure-borne noise.

How does this much power impact the service life?

The results are very positive. And what is even better is that, with the optional FanCheck function, we can offer a smart maintenance concept. FanCheck constantly calculates the statistical service life based on the actual operating conditions. This means that the costs for the replacement can be optimized in the planning. ●



MORE INFORMATION CAN BE FOUND
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QUIETER

50%
MORE AIR PERFORMANCE



REPLACE
ME!

Intelligent maintenance concept
with FanCheck

WOULD YOU HAVE RECOGNIZED IT? — THE DIAFORCE IS REVOLUTIONIZING ELECTRONICS COOLING. TAKE A LOOK INSIDE! ↑

