



ebmpapst



Banana Tropical

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# Perfectly cool bananas!

The fruit fans at Tropical Argentina ripen bananas to perfection.

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#### Dear readers,

Saving energy is currently one of the key issues for companiesincluding, of course, for us at ebm-papst. We are carefully evaluating the different adjustments we can make to achieve our climate targets. This is currently illustrated by the major retrofit project at our German locations. Simply by upgrading to our latest generation of fans, we have achieved energy savings of around 10 percent in the respective refrigeration and ventilation systems.

But we're not stopping at simply replacing the hardware. We're also taking a close look at the potential offered by the use of intelligent fans. For instance, we're using their operating data to run the systems in line with demand, which in some cases can save up to 60 percent more energy. In this case, an attractive side benefit is that the payback period for the retrofit is reduced to less than two years.

Not only do we provide highly efficient solutions that save money, we also use them ourselves. We use the knowledge gained from this "in-house experiment" to add even more value to our solutions and services-and in doing so, help you to achieve your climate and cost targets.

The Minder

Thomas Nürnberger

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

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High-speed turbo compressors

Lund is home to one of Sweden's largest housing estates, named after a play: DJINGIS KHAN. The 316 two-story houses were built in the 1970s. Back then, the architects relied on structural ventilation using the joints. Pretty old school! After around 50 years, they initially switched to mechanical ventilation, but this was inefficient and noisy due to the AC fans. As part of their modernization, they upgraded to quiet and economical EC 回深深回 fans. Now the residents of Djingis Khan can breathe deeply and in peace. Read the full story at mag.ebmpapst.com/djingiskhan







# »Innovation is the common thread running through my life«

Prof. Dr.-Ing. Tomas Smetana has been Chief Technology Officer of the ebm-papst Group since December 2023. In this interview, he tells us about his plans for innovation and how ebm-papst can maintain its role as a technology leader.

We'd like to get to know you: What can you tell us about yourself?

I'm curious, but also very active, and I'm always open to new things. Lifelong learning is just as important to me as maintaining a balance between mind and body. I like changes that allow me to look at the world from new angles.

So changing perspectives suits you. What does this look like in a professional context?

I've been fascinated by technology since I was a child, so I decided to study mechanical engineering and later to work in product development, which is all about finding new and better solutions. I turned my hobby into a career that I really enjoy each day. I work strategically and operationally, a balanced mix of product development and business, always based on close cooperation with customers. Regardless of my position, I was and continue to be responsible for spearheading innovation. This is the common thread that runs through my professional life.

What strengths do you bring to your new role as CTO at ebm-papst and which areas do you intend to address?

I would describe myself as a "creative gogetter." For me, the only kind of innovation that counts is innovation that leads to a profitable and scalable business. The ability to generate new ideas together with development teams and implement them successfully and consistently is something I consider to be my strength and an important task for the company. Finally-but also most importantly-I always focus on the key stakeholders: our customers! Only through new, innovative solutions with added value can we inspire them and maintain our technology leadership in the long term.

#### What does technology leadership mean to you?

Ultimately, technology leadership also means market leadership in my view. I can focus completely on customers and the added value we generate for them. Conversely, I don't need to worry about the competition because

they can't offer comparable solutions. A technology leader can shift or even redefine the boundaries and conditions in the established industry. And lastly, a technology leader always looks ahead. When stragglers are just starting to adapt, the leader is already setting new standards. In the future I still see ebm-papst in the role of a technology leader.

You've been at the company for a few months now. What do you think of ebm-papst? What does the company mean to you?

From day one, I had a clear sense of ebmpapst's corporate DNA, which is anchored in the core values of efficiency, passion, and humanity. Energy-efficient fans play a crucial role in ventilation and heating technology and generate excitement among our direct customers and, above all, among end customers, who save money as a result. I really notice the humanity in the close cohesion within our team and the connection we have with our company. I was welcomed very warmly and I get all the support I need, both in my daily work and in my private life. As CTO, you are actively shaping the future of ebm-papst and the industry. Which direction do you think things need to go in, including with regard to the challenges of climate change?

There will not be a single solution to climate change, but rather a combination of many, heterogeneous measures. There is too much public discourse about electromobility for motor vehicles, but not enough about topics such as regenerative heating for buildings and industrial process heat. The importance of green hydrogen as an energy storage medium will increase significantly. Gas combustion and gas turbines as a means of coupling heat and power generation will experience a renaissance in this context. Another technology that we will not be able to do

READ THE FULL INTERVIEW ONLINE: mag.ebmpapst.com/smetana

> "We will incorporate even more intelligence into our products."

without in future is decarbonization. These are all reasons why I want to drive forward the development of innovative heating and cooling systems and solutions for Power-to-X at ebm-papst, in addition to optimizing our product portfolio.

What flagship technologies and products can customers expect in the short and medium term?

We will continue to set standards in our core business with efficient fans. This includes aerodynamically and aeroacoustically optimized impellers, innovative, highly efficient electronics, and also efficiency-optimized electric motors with high power density. We will also incorporate even more intelligence into our products in the future so

that operating points can be recognized and anomalies detected in good time. Thanks to connectivity, our fans can be integrated in the cloud to optimize energy management, for example. By combining our many years of expertise with artificial intelligence, we can achieve significant gains in efficiency! When we talk about power density and efficiency, our oil-free high-speed compressors for sustainable refrigerants also represent the absolute pinnacle. In the medium term, I also see major advances in innovation at the system level. For instance, the current design of the heat pump represents the first generation. As we have both a creative development team and a great product portfolio, there will also be another generation of heat pumps. We'll definitely talk about that in one of our next interviews!





# Best of the bunch

Tropical Argentina SRL is truly passionate about fruit! The company is based in Buenos Aires and stores bananas and many other fruits in <u>special ripening tunnels</u> before shipping them to supermarkets and distributors. For the first time, they will be using energy-efficient EC technology from ebm-papst to equip the latest system they planned and built.

COMPANY Tropical Argentina SRL, Julio Caamaño S. A.

> LOCATION Buenos Aires, Argentina

Right, bottom: At Tropical Argentina, they do everything to achieve perfectly ripe bananas. Together, air conditioning experts Hugo Caamaño from Julio Caamaño S.A., Ariel Reig from Tropical Argentina, Gustavo Mosquera from ebm-papst, and Manuel Caamaño (from left to right) have developed the right solution.



When it comes to bananas, nobody works as quickly and efficiently as Tropical Argentina. The Buenos Aires-based company refers to itself as a fruit-focused fanatic, and regardless of whether they are imported or cultivated locally, fruits are in the best of hands. As Argentina's largest supplier with a passion for bananas, they are the go-to expert when it comes to storage, ripening, and sales. The company mainly sources the green fruits from Ecuador, where they are harvested while unripe. The fruits are still green when they arrive at their warehouse at the Buenos Aires wholesale market. They are then ripened perfectly in specially developed ripening tunnels. From there, Tropical Argentina supplies the perfectly yellow fruit to supermarkets and distributors. This is important because customers don't want their bananas to be green or brown-and bananas quickly become overripe. The interaction of air, moisture, and a mixture of ethylene ensures that the fruit is delicious and yellow, with all the parameters perfectly aligned.

#### A complex process for perfect fruit

Ariel Reig is Technical Director and also responsible for planning and constructing the tunnels. He explains: "The ripening process begins with us loading 20 pallets with crates full of green bananas into the individual sections of the tunnel. For each of these units, we take manual measurements of the fruits and then determine the parameters using the application software we developed at Tropical Argentina." It is important to simulate the natural environment as precisely as possible. "We control the humidity, air speed, and pressure, as well as the temperatures in the tunnel." Tropical Argentina developed the process and has perfected it over the years. The air has to be circulated around the bananas evenly from all directions. If this is not the case, they may ripen unevenly.

Reversible fans, which most of the time rotate in one direction and then the other, always delivering the same volume flow, are necessary to ensure a uniform air flow. For this to work, the fans must be equipped with symmetrical rotor blades and with a motor that allows the direction of rotation to be changed. Once the ripening process is complete, the remaining ethylene must also be completely extracted from the air in the room. If there is any residual ethylene, the newly stored bananas ripen too quickly.

The Argentinian company Julio Caamaño S.A. is responsible for manufacturing and supplying the cooling system evaporators and capacitors for the banana ripening process in this case. The refrigeration technology specialists from Julio Caamaño built evaporators and capacitors for 20 of these kinds of ripening tunnels, and installed them in 2023. Previously, they always used AC fans with external controls for this purpose. When the customer once again requested equipment for 20 new tunnels, highly energy-efficient fans and fans that offer the option of speed control were needed, which is why both companies decided to draw on EC technology from ebm-papst. "We've had our eye on it for a while, as the energy efficiency is outstanding. AC fans are currently still common here in Argentina and that's why we are also expecting to gain a competitive advantage from the new technology," explains Manuel Caamaño.

#### Custom EC motor

When searching for the right fans, the technicians at Caamaño got in touch with their long-standing contact person Gustavo Mosquera at ebm-papst in Argentina. "During the process of selecting the components, we make sure that they are durable and maintenance-free," emphasizes Manuel Caamaño. "In the past, ebm-papst's solutions have always met

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### "In the ripening process, it is important to simulate the natural environment as precisely as possible."







Caamaño supplied Tropical with EC motors from ebm-papst combined with special fans with symmetrical impellers. These ensure optimum air flow and can be precisely controlled **Ripeness levels are** manually checked on a regular basis.

these requirements." Gustavo Mosquera worked with sales engineer Cathrin Eisenmann in Germany to find the right EC solution for the requirements. They decided on an EC motor with a diameter of 150 millimeters and a specially designed shaft. "A size II2 motor would actually have been big enough, but the 1.5 kW electronics did not meet the requirements,"

## "Thanks to the EC motors, **Tropical Argentina can** make energy savings of 50 percent—which is really fantastic!"

MANUEL CAAMAÑO ---- JULIO CAAMAÑO

recalls Eisenmann. "That's why we decided to move up to the next size with 4 kW and designed it to be less powerful."

Those at Caamaño's site were impressed by the test motor supplied from Germany, but there was still another challenge to overcome-the heating tests. These tests are mandatory, but can only be carried out with the fully assembled fan-i.e. the motor including impeller. And since the impeller came from a supplier from Argentina and the motor from Germany, ebm-papst was unable to perform the

tests itself as usual. Together with the engineers from the development department in Germany, Cathrin Eisenmann decided to send the motor along with thermal sensors to Argentina with precise instructions so that Caamaño was able to perform the tests itself in its own facility. "Caamaño's technicians and Leandro Basterra from ebm-papst Argentina really did an outstanding job," states Eisenmann. "We received all the necessary data and our development team was very satisfied." Having passed the high-temperature test, the way was cleared for series production of the motor with a shaft that ebm-papst will now exclusively produce for Caamaño.

#### Energy consumption cut in half!

In winter 2023, the fitters from the Argentine refrigeration and air conditioning specialists installed the new fans in the new tunnels for the first time, and everyone involved was impressed by the result: "Thanks to the EC motors, Tropical Argentina can make energy savings of 50 percent—which is really fantastic," says Manuel Caamaño. Another advantage is that the motors can be controlled via Modbus. "This enables each phase of the ripening process to be controlled very precisely." If the bananas are meant to be stored for longer and ripen more slowly, the air flow is reduced and if they are meant to ripen more quickly, it is increased. Ariel Reig explains: "Previously, this was really complicated, but because controlling the EC motors is simpler and more precise, the work will be made easier for us in the future. The automatic process enables us to stabilize the ripening process more easily and quickly, thus improving the quality of the fruit."

#### More EC for Argentina

The three project partners are all equally delighted with the success of the project. Hugo Caamaño emphasizes: "Everybody played their part in the success of the project—Tropical Argentina with its many years of experience in ripening bananas and planning and constructing tunnels, ebm-papst as a market leader in fan technology, and Caamano with our specialist expertise in refrigeration and air conditioning technology. Thanks to this close cooperation, we were able to develop a fantastic new product-and gain a real competitive advantage with EC technology." Gustavo Mosquera adds: "Working with customers like Caamaño is a lot of fun, as we have built up a great relationship over many years and have already worked together in the future."





together to put several projects into practice. But the banana-ripening tunnels were something very special. We developed something new for an application for the first time. Let's see what we do

Manuel Caamaño already has a specific plan: In addition to constructing new ripening tunnels, he wants to secure retrofit orders. The market in Argentina is large and each tunnel is equipped with five fans, with Tropical Argentina alone having 100 tunnels in use. AC fans have been used in all situations in the past, but this is something Reig wants to change, as he wants to replace them with the new EC solution in a joint venture with Tropical Argentina: "We also want to sell our product to other fruit wholesalers, and with energy savings of 50 percent, we have the best sales argument!"

DISCOVER THE BANANA RIPENING TUNNELS IN mag.ebmpapst.com/ tropical



#### LOW-NOISE COOLING

Tropical and Caamaño also rely on EC fans from ebm-papst for the table-type capacitor outside the building — AxiBlade EC axial fans with a size of 910 millimeters are used in the pressure-controlled system. Although energy efficiency also played a role when selecting the components, this was not the only factor to be taken into consideration: "For the capacitor, the main requirement is a low noise level. The device is also used in residential areas and loud fans would disturb the neighbors, especially at night," says Manuel Caamaño, explaining the decision to opt for the AxiBlade fans. The pressure control automatically reduces or increases the speed of the system as required, which saves energy and also reduces noise.

COMPANY ebm-papst Group, Pfänder GmbH

LOCATION Mulfingen, Germany

> Operators and service teams can access operating data on a dashboard, smartphone, or tablet.

# Switching to higher intelligence

ebm-papst is taking another step towards Scope 1 and 2 climate neutrality by retrofitting the refrigeration and air conditioning systems at its German locations. However, the upgrade to the latest generation of EC fans will not only deliver major energy savings, but also open the door to a whole world of digital added value.

s part of its sustainability strategy,

tified a total of 261 systems that were eligible for an upgrade to the latest fan technology. The large-scale replacement started in the course of 2023 and is still ongoing. Depending on whether the existing fans were AC or EC, ebm-papst is now achieving energy savings of between 10 and 50 percent with the new fans.

More energy savings through digitalization

So the savings from the hardware replacement alone are already considerable. But by networking the latest RadiPac and AxiEco fans that are now in place with the digital environment, there is even more added value: from further energy savings, higher availability, and a longer service life to traceable and sound ESG reporting.

To achieve this, the new fans were initially connected to the epCloud platform via an ebm-papst neo gateway. Data such as speed, power consumption, and, depending on the sensors used, also the temperature and CO<sub>2</sub> concentration of the air being moved, for example, is supplied to the platform. The



Depending on the previously installed fan solution ebm-papst is already achieving energy savings of 10 to 50 percent simply by replacing the hardware in the systems.

ebm-papst took a close look at the refrigeration and ventilation systems at its three German locations in Mulfingen, St.Georgen, and Landshut. The retrofit team iden-

fans and their operating data are then displayed on a dashboard that operators and service teams can also access on a smartphone or tablet while on the move. "The first and most important step is to visualize how the system is running," says Waldemar Wagner, Director of Product Management at ebm-papst neo. "This way, if the system is operating inefficiently, it is immediately obvious." Take a heat map, for example, which shows the consumption for a week in color, divided into hourly segments. "We could immediately identify the times when a system was running completely unnecessarily-and adjust this immediately." If configured accordingly, the system can also send alarms if anomalies are detected during operation.

The data can be used for demand-based ventilation. In Mulfingen, this was initially implemented in a building section with several meeting rooms. The system no longer runs in these rooms between 6 p.m. and 8 a.m., which saves around 60 percent more energy. In addition to this block control system, the ventilation is now only activated when someone is in a meeting room.

As a result, ebm-papst saves energy and costs while also improving air quality, as the speed of the fans adapts to various ambient parameters such as temperature and CO<sub>2</sub> concentration with the help of EC motors that can be regulated as required.







The Pfänder GmbH retrofit team linked almost 70 of the replaced fans with gateways from ebm-papst neo. These gateways transfer operating data to the epCloud via LTE-and draw power from the fan.



CHECK OUT OUR MULTIMEDIA STORY ABOUT THE RETROFIT:



mag.ebmpapst.com/ home-retrofit

## "The first and most important step is to visualize how the system is running."

WALDEMAR WAGNER

DIRECTOR OF PRODUCT MANAGEMENT AT EBM-PAPST NEO

The value of the digital link becomes even more apparent in another example highlighted by Wagner: "One system displayed an extremely poor efficiency level, and we could see from this that the filter must have been very dirty." This led to the development of a digital solution that measures the degree of filter contamination without additional sensors and enables customers to better plan service calls. It is based on an analysis of the fan's operating point. The system sends a notification when the filter should be changed. Users can specify the level of contamination at which the notification is sent. The major advantage of this is that the filter is only changed when it is really necessary, not because the service technician is back for the regular maintenance appointment. In future, the digital service will also be able to predict the optimum time to change the filter, taking into account both the overall costs of the system and  $\mbox{\rm CO}_2$  emissions.

The same also applies to the fan itself, of course. This predictive maintenance saves additional costs, as the fan always runs in optimum condition and the system has reduced downtime.

#### ESG reporting at the touch of a button

Waldemar Wagner points out another major advantage of performance data for operators: "Besides the great potential for optimization, the data is also valuable for ESG reporting. Our solution provides precise data in areas where it is currently only possible to estimate the proportion of CO2 emissions caused by ventilation systems. And in a further expansion stage, we want to be able to deliver this entire section of the report."

With the retrofit at its own locations, ebm-papst can now demonstrate many of the digital added values from its own experience-and work on the planned benefits.

COMPANY Haglund Industri AB

# **Cool service**

Haglund Industri is a Swedish manufacturer of professional refrigerated appliances for the catering sector. In their new **BRIS** refrigerator series, they exploit the physical laws of convection to reduce energy consumption through additional air flows in the refrigerator. Energy-saving fans from ebm-papst helped achieve this.



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LOCATION
Gällstad, Sweden
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"Thanks to EC technology we have reduced energy consumption of the fans in our refrigerators by 80 percent."

JOHAN HAGLUND ---- CEO HAGLUND INDUSTRI



n the catering industry, it's all in a day's work: the restaurant is full, the tables are packed, and a buzz of conversation fills the air. Waiters rush back and forth, taking orders and serving dishes. To ensure that the food is always as fresh and crisp as possible when served, it must be kept perfectly chilled. Refrigerators need to maintain their optimum internal temperatures, especially when things are busy and their doors are being frequently opened and closed. They are usually in operation around the clock, meaning that energy consumption is an important cost factor. Businesses can save significant sums of money by using the right fans in their appliances.

#### Traditional and innovative

Swedish refrigeration technology manufacturer Haglund Industri has been in business for more than 150 years. What began with the production of sheet metal products by hand developed into the production of refrigerating appliances for the catering sector in the 1950s. Their wide product range now encompasses everything from standard refrigerators and freezers, refrigerated display cases, and freezer cabinets to blast chillers and customized high-end wine displays. Ever since, Haglund Industri has been characterized by high quality and innovative solutions. The family-run company, now in its fifth generation, produces locally in Gällstad in Sweden and employs 150 people. "We have always tried to push the boundaries of technology. This is also the reason why we chose ebm-papst as a partner. Like us, they are at

the forefront when it comes to the technological development of their products," says CEO Johan Haglund.

The Swedish company has been primarily using EC fans with so-called energysaving motors (ESMs) for several years now. These fans are not only particularly compact and durable but are also characterized-as their name suggests-by their high energy efficiency. Thanks to their low heat loss and expected life of more than 40,000 hours, they are optimized for permanent operation in refrigerated cabinets. "When we started converting our products to the lowest possible energy consumption, ESM fans contributed significantly," says Martin Sahlman, Head of Sales and Marketing at Haglund Industri.

Focus on quality—including fans

Since then, Haglund Industri's focus has been on developing products that are both high tech and high quality. "As a German quality brand that is known not only for its durability but also for its good energy efficiency, ebm-papst has proven to be a success story for us," says Sahlman. The two companies have been working together for more than 20 years now and are continuing to



In its new BRIS refrigerator series, Haglund makes clever use of convection—the natural sinking of cold air—to save even more energy.

> develop together. Haglund Industri's goal is to reduce the energy consumption of its products even further. "Thanks to EC technology we have reduced energy consumption of the fans in our refrigerators by 80 percent," says Johan Haglund with satisfaction. The company is planning to reduce the total energy consumption by another 35 percent for its next generation of products.

#### How physics can be cool

In refrigerators, a closed refrigerant circuit removes heat from the interior, resulting in a lower temperature in the cooling chamber. In its new BRIS refrigerator series, Haglund Industri is using their own MONSUN technology to exploit the physical laws of convection in addition to the thermodynamic cooling principle of a refrigerator. The BRIS simply use the fact that cold air is heavier than hot air, removing air from the floor level through a channel in the back of the cabinet up to the condensor, always utilizing the coldest natural air in the facility. This, in combination with the effective EC fans, leads to bestin-class energy efficiency, low noise level, and less wear compared to conventional solutions, where air is circulated at the top.

Another advantage of this technology is that multiple cabinets can be set up next to each other in tight spaces without any overheating issues and still provide excellent cooling performance."The reduction in energy consumption and the low noise level would not be possible without the ebm-papst fans," says Johan Haglund.

COMPANY Grow-tec, Klimallco SA (Manufacturer)

LOCATION

# High tech for medicinal cannabis

The market for medicinal cannabis is booming worldwide. Israeli company Grow-tec offers the technology that enables cannabis growers to reap a rich harvest from <u>indoor plantations</u>. AHUs from Klimallco, a Greek air conditioner manufacturer, play a key role in this.

annabis is considered a true miracle cure. Over 500 substances are contained in the plant, and its healing properties have been known since ancient times. The active ingredients in the flowers have a pain-relieving and muscle-relaxing effect and stimulate the appetite. For a long time, the use of cannabis was illegal in most countries, but more and more governments have relaxed their laws in recent years and allowed its use for medicinal purposes. Since then, the industry has been booming, recording double-digit growth rates worldwide every year. And as demand increases, companies specializing in cultivation are investing in new indoor plantations to meet this need.

Although the cannabis plant is quite undemanding, the fact that the weather usually does what it wants means that indoor cultivation is much more reliable, and is also possible regardless of the season or climate zone. The quality and growth of the plants is also easier to control and manage. Another advantage of indoor cultivation is that this valuable produce is better secured in a lockable building. This is good news for Grow-tec from Israel. The company, located between the city of Nazareth and the Sea of Galilee, specializes in indoor facilities and offers high-tech turnkey systems that enable the cultivation of cucumbers, tomatoes, and even medicinal cannabis indoors with ultra-high yields and quality that could not otherwise be achieved.

Grow-tec designs finely balanced systems for HVAC, irrigation, and climate control. Thanks to Grow-tec's expertise, these systems create the optimum climate for the plants, while taking all the environmental conditions—light, CO<sub>2</sub> concentration, and, most importantly, air circulation—into account. To achieve this, the specialists at Grow-tec needed high-performance air handling units (AHUs) so that the temperature and humidity in the buildings, some of which are several thousand square meters in size, remain stable. This is because excessive humidity damages the plants. In addition to air performance, energy consumption is also an important criterion, from both an environmental and a financial perspective. And Grow-Tec also had a special wish: that the AHUs be painted green. With this list of requirements, the Israeli experts set out to find a suitable manufacturer. They found what they were looking for in Klimallco, an air conditioner manufacturer from Greece, just 30 kilometers east of the capital Athens.

#### A breath of fresh air from Greece

Klimallco was founded 25 years ago and exports its climate control solutions to 14 countries worldwide. Jim Borsis, Managing Director at Klimallco says: "Our customers are mainly companies that require turnkey solutions for various sectors such as hospitals, logistics centers, or schools." Efficient and environmentally friendly devices are



The green paintwork is a special feature of Grow-tec AHUs.

a trademark of the Greek manufacturer. "This is why we have been working with ebm-papst since we were founded. And this project in Israel is no exception," explains Borsis. Klimallco uses RadiPac fans from ebm-papst for the AHUs required by Grow-tec-26 fans in total. The RadiPac product range was specially developed for AHUs. Thanks to the EC motor, the RadiPacs can be regulated as required, which makes them very energy efficient. The geometry of the impeller has also been optimized so that particularly high air performance and a high pressure increase are possible at the same time. As Borsis explains: "The fan offers a brilliant combination of efficient performance and compactness thanks to its small external dimensions and air flow capacity." Klimallco's solution proved a winner and Grow-tec now offers its customers efficient and powerful systems for cannabis production. And thanks to the special green paintwork, the AHUs blend in well among the thousands of cannabis plants gently swaying in the artificial wind.

COMPANY **DFI Retail Group, City Facilities** Management (HKG) Limited

LOCATION Hong Kong, China

# **Cool** for the climate

The DFI Retail Group wants to drastically reduce its energy consumption and has launched a huge retrofit project in its approximately 1,000 supermarkets and grocery stores in Hong Kong: 10,000 of its older fan drives have been replaced by energy-efficient EC motors.

very morning at 8 a.m. the Market Place supermarket in Hong Kong's The Wai shopping mall opens its doors to the public. The shopping center is located above Tai Wai station, a subway

hub in the north of the city. Thousands of customers reach into the refrigerated display cases and enjoy the fresh produce right up until closing time at 11 p.m. Jon Abel, for his part, is pleased that the refrigeration of these products is now much more efficient. The Market Place supermarket is just one of many thousands that Abel looks after. He is Group Facilities Management Director at the DFI Retail Group, one of Asia's largest

retailers. In this role, he is responsible for ensuring that operations run smoothly in the 10,600 supermarkets and grocery stores that the group operates in 13 countries under 27 brands. Besides Market Place, this also includes the Wellcome supermarkets and 7-Eleven stores, which satisfy the hunger and thirst of millions of people in the Pearl River Delta Metropolitan Region. Three years ago, DFI implemented a climate program. "We want to emit 50 percent less CO<sub>2</sub> by 2030 and be climate neutral by 2050," says Abel.

To tackle this task, Abel enlisted the help of Joe Chow, who heads the Energy and Sustainability department at City Facilities Management (HKG) Ltd., one of the world's largest facility management companies: "We support our customers with a wide range of facility management services, including routine maintenance of equipment, cleaning services, and clever strategies to save energy." Together, the partners set about taking measures to reduce DFI's environmental footprint.

Supermarkets are an energy-intensive business, with refrigeration and air conditioners consuming a large proportion of the electricity. "Here in Asia, it's very hot all year round with high humidity. We have to combat these environmental conditions on a daily basis so that we can keep the temperature in the refrigerated display cases at



The DFI Retail Group operates 10,600 supermarkets in Asia and is aiming to be carbon neutral by 2050. Group Facilities Management Director Jon Abel (left) has therefore commissioned Joe Chow from City Facilities Management (HKG) Ltd. to make their refrigeration units more efficient



a constant zero to four degrees Celsius and as low as -18 degrees Celsius in the freezers," says Abel. The refrigerator and freezer shelves are therefore an important factor in reducing energy consumption. "Most of the appliances had AC motors, so we decided to replace them with efficient EC technology," explains Chow, who therefore approached the ebm-papst team in Hong Kong with this issue in mind.

#### An efficient motor for cooling

In Hong Kong, Chow met up with Daniel Yiu and Darius Wu, who are very familiar with solutions for refrigerators and freezers. "Our iQC motor was specially designed for refrigeration units and copes very well with the harsh environment that exists there," says Yiu. The motor is crucial for efficient operation. It has to run around the clock and drive the impeller, which distributes the cold evenly in the appliance. If it fails, the merchandise is at risk of spoiling. A high level of reliability is therefore required. Thanks to EC technology, the iQC motor is much more efficient than the older models in the Q motor series, but is the same size. As Wu

# "If we can achieve energy savings of 50 percent just by using EC technology, we will take a closer look at all our appliances

#### JON ABEL

with motors."

**GROUP FACILITIES** MANAGEMENT DIRECTOR DFI RETAIL GROUP

explains: "This makes the fan drive ideal for retrofitting." This is a good selling point for DFI and City Facility Management, as 80 percent of the appliances already run on ebm-papst motors. Initially, three supermarkets were selected for a pilot project and the old motors were replaced by the new iQC model. Abel and Chow were impressed by the initial measurements, which showed that the fans consumed 50 percent less electricity while achieving a better air performance. "We also inquired with other manufacturers, but ebm-papst provided the best compatibility and results for existing system," says Chow.

#### Retrofit in record time

Due to these positive results, Abel and Chow decided to implement the retrofit on a large scale, aiming to replace around 10,000 motors in some 1,000 stores in Hong Kong in just six months. This was no easy task, and not just because of the sheer numbers involved and the tight schedule: "With a project like this, there are many players that we have to coordinate in advance," says Abel. In addition, there had to be as little disruption to operations as possible so that business

### The supermarket at night: how the retrofit works



leave the supermarket and the

fitters can start work

The employees clear out the shelves and remove the housing



The fan is then removed and the old impeller takon out

... so it is screwed tight and wired in just a few

simple steps





The iQC motor helped Darius Wu (right) from ebm-papst Hong Kong win over the customer: Thanks to EC technology. it is efficient, durable, and ideally suited for retrofitting

could continue as normal. For those involved, this meant working a lot of night shifts as the retrofit had to be carried out outside of business hours. No sooner had the last customer left than the fitters got to work removing the merchandise, replacing the motor, and putting everything back in the appliance. This takes about an hour per refrigeration unit. "The retrofit itself is very simple; the old motor is replaced by the new, plug-&-play ready within ten minutes," explains Chow.

#### Excellent energy footprint

The effort has paid off. In just six months, DFI has already saved 1,270 tons of CO<sub>2</sub>. This is not only good for the climate, but also for business, as energy costs have already been reduced by 350,000 US dollars. "The retrofit will have paid for itself in two years," says Abel. There is also another benefit: thanks to EC technology, the iQC motors have a much longer service life, as brushless motors

#### RETROFIT







Before the old motor is removed the technician measures the air



New meets old: the iQC motor has the same mounting points as its predecessor ...



The result can be measured immediately after use: the air flow is higher and the current consumption halved.

8

After a total of one hour. the retrofit on a refrigeration unit is complete



don't wear out due to friction. The retrofit means DFI is already closer to its climate target. But Abel and Chow still have a lot to do. More retrofits for branches in Singapore and Malaysia are planned next. "If we can achieve energy savings of 50 percent just by using EC technology, we will take a closer look at all our appliances with motors," says Abel, referring to the air conditioners and fan coils at work in thousands of stores every day.

COMPANY Pick n Pay, AMC Engineers, HC Heat-Exchangers

LOCATION Johannesburg, South Africa

# The largest cold chamber in Africa

The new distribution center for the Pick n Pay supermarket chain near Johannesburg is the largest in Africa. Thanks to the expertise of Cape Town-based engineering firm AMC and appliances manufactured by HC Heat-Exchangers, the merchandise stays fresh with minimal energy consumption.

isible from the windows of planes approaching O.R. Tambo International Airport from the north is what is likely the largest roof in the southern hemisphere. At 279 meters wide and 411 meters long, it spans the main hall of the distribution center,

which was completed in 2023 in the Eastport Logistics Park on the outskirts of Johannesburg. If you add up all the sections of the building, the mega structure covers an area of 165,000 square meters. The elegantly curved roof conceals merchandise for the Pick n Pay supermarket chain that is stored and distributed to stores from here. To ensure that the food doesn't spoil, a 46,000 square meter area

of the distribution center is refrigerated. The area is divided into two climate zones. One zone has a temperature of 14 degrees Celsius, the other is at 2 degrees Celsius. It is important that the temperature is constant and evenly distributed throughout.

#### Engineering, made in South Africa

AMC Engineers was commissioned to design the cooling system. The engineering firm from Cape Town specializes in cooling systems for food processing companies and is very familiar with the very high hygiene requirements that apply with regard to fresh air, filtration, humidity, and temperature.

Reflecting on the project's scale, Andrew Minnaar, the director at AMC responsible for the project, says: "The cooling principle itself is nothing new for us, but what was special were the huge dimensions of the facility." AMC was not only entrusted with the design of the system, but was also responsible for selecting the manufacturer and suppliers. For Minnaar, it was clear early on that EC fans should be used in the refrigerated blower coils. "The cooling runs day and night, so low energy consumption is crucial." So Minnaar turned to Francois Schoombie, Technical Manager, and Stephen Friedmann, Sales Director at ebm-papst South Africa. They quickly realized that AxiCool fans could be

the right solution: "Our engineers developed these specifically for cooling in the food sector. The surfaces are designed to prevent pollution from settling on them so that hygiene standards can be maintained."

The low noise level is an additional plus point, as one of the requirements was that employees should still be able to talk while the system was running. But the clinching factor was the fans' air throw because the dimensions of the hall meant that very long distances had to be covered. "Originally, we planned three rows of blower coil units each, mounted evenly on the ceiling across the entire width of the hall. But as the AxiCool fans are so powerful, two rows were

sufficient," says Minnaar. Thanks to integrated guide vanes, the ebm-papst fans can easily cover a distance of up to 45 meters. A total of 86 cooling units were installed on the ceiling, each with four AxiCool fans-making 344 fans altogether.

Easy installation and monitoring

HC Heat-Exchangers built the systems itself. HC, the leading provider of heating, ventilation, air conditioning, and refrigeration solutions in Africa has also been working with ebm-papst for many years. Gert van Rooyen, Lead Applications Engineer at HC, explains: "We really like the products. We are always



looking to make things better and more efficient." Besides efficiency, the manufacturer particularly appreciates the integrated Modbus communications interface combined with the EC motors, which makes it possible to conveniently monitor every single fan and operate it as required. "With such a large number of fans, it's not immediately obvious if one is faulty. Especially when they are hanging at a height of up to 18 meters and are difficult to reach. It's a big advantage if you can monitor their status in real time on a computer," says van Rooyen. Minnaar from AMC is also convinced by the overall result: "The end customers are very satisfied with the system and the system works reliably."



COMPANY Detherma GmbH

# Germs? Blown away!

Cystic fibrosis is a serious lung disease. Inhalation alleviates the symptoms of sufferers, but only if their medication nebulizers are completely dry and therefore germ-free. To help with this, Detherma has developed a <u>new type of disinfection device</u> featuring a powerful compact fan that distributes a large volume of hot air.

round 8,000 people in Germany have cystic fibrosis, a hereditary disease that primarily affects the lungs. Inhalation brings the medication directly to where it is needed and is therefore one of the most important treatment methods for those affected. However, the devices used for this purpose, known as nebulizers or inhalers, can also pose a health risk. If they themselves become a source of germs, they transport viruses or bacteria directly into the already weakened lungs. Hygienic cleaning of inhalers is therefore an important part of cystic fibrosis therapy—and of everyday life for people with the disease. "Having time for friends, family, and leisure is also a form of inclusion and health. Unfortunately, this is something that many sufferers miss out on," explains Michael Nordmann, co-founder of Detherma GmbH.

Until 2018, Michael Nordmann himself had no points of contact with cystic fibrosis or inhalers. That is, until he met Peter Krüger through his previous work for an injection molding company. Krüger had developed and patented a disinfection device for stainless steel inhalers. Nordmann was enthusiastic: "He wanted to develop the LOCATION Mühlhausen, Germany

device into a less expensive plastic one. I found the concept and the idea behind the product convincing." So convincing that he became an investor and, together with Krüger and three other partners, founded Detherma GmbH as an independent company for the sale of disinfection devices. But what makes the device so innovative?

#### Germ-free through drying

There are several disinfection devices on the market that disinfect inhalers without germs. The problem is that they do this with water vapor and the inhalers therefore come out of the disinfection process wet. When they are dried in the ambient air or with a cloth, water droplets remain on the freshly cleaned inhalers. This can lead to the build-up of dangerous, humidity-loving germs. So, for the health of cystic fibrosis sufferers, a device is needed that blows away all the residual water immediately after cleaning. This is the innovation behind the Detherma device: The nebulizer comes out germ-free and dry, ready for its next use, after just 55 minutes. For the drying process, a compact fan draws in fresh air through a HEPA filter and conveys



Once the disinfection device has been installed, all electronic elements are checked to ensure they are functioning properly.



Above: Here, the upper part of the air duct is being fitted with small screws. The compact fan will later be installed in the small white module.

Below: The fan module is decoupled from the housing with this small silicone damper. This prevents vibrations from causing a rattling noise



"As a start-up, it's a huge bonus for us to be supported by the developers at ebm-papst in this way."

#### MICHAEL NORDMANN

CO-FOUNDER OF DETHERMA GMBH

the air into the disinfection and drying basket. Compact fans from ebm-papst already performed this job in Peter Krüger's patented stainless steel appliance. So, when the new plastic product was being developed, it was clear that the same fans would be needed again.

However, despite their experience with the stainless steel device, a few challenges awaited the developers and the compact fan they were looking for: "The fan has to be very powerful so that it can draw in enough air through the HEPA filter. But because the disinfection device is used in the patient's home, it should still be very quiet, virtually inaudible. And because it is used several times a day, the fan must also work reliably over the long term," explains Michael Nordmann.

#### Small damper, big effect

Detherma sent a prototype of the plastic disinfection device to ebm-papst in St.Georgen. Richard Kienzler, Sales Engineer at ebm-papst, suggested using the 422J axial fan due to its small installation dimensions: "It's very powerful, so it can still deliver the required air flow at a low speed—and therefore quietly. This is due to the blade geometry, which generates the high pressure increase and air flow." Detherma was satisfied with the initial measurements and installed a larger number of fans in disinfection devices.

However, the noise level was suddenly no longer acceptable in some of them. Some-supposedly identical-devices were loud,



Michael Nordmann was so convinced by the concept of the disinfection device that he co-founded Detherma GmbH as an investor and partner.

while others were not. "ebm-papst then quickly carried out tests in the laboratory that we couldn't do ourselves," says Nordmann. Richard Kienzler explains the result of the measurements: "No matter which fans we installed in a loud device, it always remained loud. And the quiet devices remained quiet, whatever the fan model. So it had to be the housing." The matter was explained by the discovery that even tiny differences in assembly led to the noise. So Detherma installed a silicone damper in the cover. "Of course as a start-up, it's a huge bonus for us to be supported by the developers at ebm-papst in this way. Even though we haven't ordered thousands and thousands of products," says a delighted Michael Nordmann.

Detherma is convinced of the importance of the product. What is still missing is official approval as a prescription-only medical product in Germany-a process that may take some time. But Michael Nordmann and his partners are in good spirits: "The feedback from clinics, rehab facilities, and people with the disease has been very positive. Many cystic fibrosis sufferers who use the disinfection device tell us that they have not had any lung infections for a long time. That is, of course, exactly what we want to achieve." The disinfection device can also have a positive effect on patients with COPD, a chronic lung disease, as some doctors have already reported.

Cleaning inhalers using the Detherma device is very easy for these doctors and their patients. They simply need to put the nebulizer into the device, press the start button, and take it out 55 minutes later, clean and dry. More time for enjoying life—and health.

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 $\eta_{\text{overall}} = \eta_{\text{PowerElectronics}} \times \eta_{\text{Motor}} \times \eta_{\text{GasBearing}} \times \frac{P_{\text{Aero, isen}}}{P_{\text{Aero}} + P_{\text{Leakage}}}$ 

The higher the overall efficiency of a turbo compressor, the less electrical energy it needs to do the same work, but the efficiency of each individual component is crucial.

f you want to save money and energy with your fans, motors, and turbo compressors, efficiency—or  $\eta$ —is probably the most important indicator. After all, it shows how efficiently machines can convert power input into useful power output. If efficiency is high, a large proportion of power input gets to where it is supposed to go. If, on the other hand, it is low, power is mainly lost as waste heat.

The efficiency referred to in this attractive formula is the overall efficiency  $\eta_{overall}$  of an oil-free turbo compressor. It is the mathematical product of many other efficiencies, namely of each individual component that delivers power when compressing refrigerants and other gases. This includes upstream power electronics ( $\eta_{PowerElectronics}$ ), which control and transmit the electric current to the motor, as well as the motor  $(\eta_{Motor})$ , which converts the electrical energy into mechanical energy. The efficiency of the oil-free gas bearings  $(\eta_{\text{GasBearing}})$  is also important. This is because it provides information on how smoothly the rotor is running, in terms of power loss and wear, with the compressor impeller in the bearing, in order to rotate at up to 300,000 revolutions per minute and compress gases efficiently.

The last piece of the puzzle for calculating the overall efficiency of a compressor is the efficiency of the compressor stage with the compressor impeller  $(P_{\text{Acrodynamics}})$ . Compared with the other components, this formula breaks down exactly how this

efficiency is made up. First, the ideal power consumption of the compressor stage  $(P_{Aero isen})$ —i.e. the power that the stage could provide if there were no losses. Second, the actual power consumption  $(P_{Aero})$ and the power loss due to leakage  $(P_{Leakage})$ . The ratio of the ideal power to the power actually used, including leakage, is then used to describe the efficiency of the compressor stage.

Finally, the efficiencies of all the components can be multiplied together. The result is the overall efficiency of the turbo compressor: a value between 0 and 1. A result of 0.7 means that the turbo compressor uses 70 percent of the power used to compress gases.



 $\eta_{\text{Aerodynamics}}$ 

Ahmet Çokşen is Group Leader for Aerodynamics & Product Management in the HighSpeed department.

> This compressor map for the refrigerant propane (R290) shows the overall efficiency of a compressor, with red representing high efficiency, and blue low efficiency. The diagram shows the speeds (black lines), pressure ratios (Y-axis) and refrigerant flow rates per second (X-axis) at which the compressor works most efficiently.

HOW WE DO IT

# **Knowledge that lasts**

Theory and practice come together in the new laboratory at the SENAI school in São Paulo. With the support of ebm-papst Brazil, students in refrigeration and air conditioning technology are preparing for a sustainable future. For themselves-and the entire industry.



This is where students learn directly from the latest fan models.

-55 million to date. Refrigeration and air conditioning students always learn with cutting edge technology. However, to prepare them for a future in which technology is constantly changing, they also need partners working on sustainable solutions. Therefore, SENAI has collaborated with ebm-papst Brazil for many years to offer young people in the industry the best learning opportunities. This includes the opening of a state-of-the-art technology laboratory in August 2023, which the partners built and equipped together. The financial support has not only provided the perfect accompaniment to the SENAI school's learning program, but has also secured the partnership until 2028.

Since 1942, the non-

profit organization SENAI has been train-

ing top-class skilled

professionals in Brazil

As Sidnei Ivanof, Managing Director of ebmpapst Brazil, explains: "We are happy to share the

helps to advance the professional development of each individual." Students benefit from the latest technical equipment and get to know energy-efficient centrifugal, axial, and diagonal blowers in practice. This deepens their understanding of parameters such as air flow, the effect of ice formation, and the optimum control of refrigerant pressure. But it's not just students who use the facilities: Thanks to a special license, the laboratory can also be used for internal training, product demonstrations, teacher trainings from other SENAI

units across the country, and for ebm-papst customers. "We are passionate about investing in the training of young people who will positively change the future of our country and the industry," says Sidnei Ivanof, summarizing the initiative.



knowledge we have

gained from our day-

MIRACLE DRIVE

Off to new heights in the areas of intralogistics. conveyor, storage, and sorting systems: The ECI 80 takes drive performance to the next level using the internal rotor principle. When combined with various modules such as encoders and spring-operated brakes, the drive with up to 750 watts of power offers the perfect solution for every automation system. ebmpapst.com/motor-series-eci



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### WIND CONDUCTOR

Up to five percent more efficient thanks to the RadiPac C Perform's special air quide modules. The modules consist of four segments that reduce the dynamic outlet losses, thereby increasing the usable pressure component. The mounting dimensions for the new flange plate are no different to those of the RadiPac C. With all these benefits. the RadiPac C Perform scores high marks in building air conditioning with more planning scope for users. ebmpapst.com/radipac

### **HIGH-TECH INTERPRETER** FOR THE WHOLE WORLD

Artificial intelligence, automated algorithms, and integrated cloud connectivity: All this is made possible by the IntelliGate Air X gateway. The Modbus controller is a true master at mediating between the physical world-for example, a fan in a ventilation system-and the internet. And it does this independently of the local network connection, anywhere in the world. With its analog connections and integrated sensors, it can not only be used universally, but also brings any application up to state of the art with its location-independent control and monitoring options. ebmpapst.com/iag

# »We already had the in-house expertise«

Why did ebm-papst develop a turbo compressor?

In recent years, the leaps in efficiency for fans have become steadily smaller due to physical constraints. At the same time, we were receiving more and more requests for compressors to generate cooling or heat. For us, the next logical step was not just to move air, but also to compress gases in general-with compact solutions that fit into various customer applications such as air conditioners and heat pumps. And there was no question from the outset that we could develop these compressors. After all, with aerodynamics, motor technology and electronics, we already had the most important expertise in-house. We just needed to bring them together and add bearing production for high-speed drives. For reasons of sustainability, we decided to develop oil-free refrigerant compressors and use natural refrigerants such as propane and isobutane.

#### Why is "oil-free" so special?

First, it is the combination with the performance classes in which our compressor operates. Until now, there have been no oilfree alternatives on the market in the range from one to 45 kilowatts of electrical power consumption. Second, our compressor runs much more smoothly without oil, thanks to a gas cushion that the drive rotor "glides" on. This enables us to achieve higher speeds with the same energy input and significantly less wear in the drive bearing. technology, ebm-papst compresses refrigerants such as propane in air conditioners and heat pumps without using any oil.

With its high-speed



<u>Philipp Handschuh</u>, Head of the HighSpeed department, explains why this is particularly efficient.



And it's also cleaner?

Absolutely! Our customers no longer need to top up or dispose of oil, which saves time and money and protects the environment. In addition, oil in heating and refrigeration circuits leads to pressure losses, poorer heat transfer, and ultimately to higher energy consumption. Furthermore, our oil-free and non-contact bearings allow significantly higher speeds to be achieved during operation, which in turn enables more compact and lighter solutions.

Speaking of refrigerants: Why does ebm-papst use propane?

It has very good thermodynamic properties and a low Global Warming Potential (GWP) value. What's more, propane is not affected by the F-Gas Regulation and covers a wide temperature range from -40 to +70 degrees Celsius. For temperatures above this, we use butane and isobutane, which also have low GWPs. Air is best suited for temperatures below -50 degrees Celsius.

### What else can customers expect from the turbo compressors?

Our platform strategy allows us to offer our compressor for many different applications and requirements. In addition, we aim to provide our customers with complete system solutions in this area too. This means that we also support our customers during commissioning and help them to optimally configure their heating and refrigeration circuits.

higher refrigeration cycle efficiency

> 3.1 kW electrical power consumption at

00

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