

A man wearing a checkered shirt, dark pants, glasses, and large black headphones is using a dry ice blaster. He is holding a nozzle that emits a white, frosty spray onto a metal component on a workbench. To his right is a large, grey and blue industrial machine on wheels, which is the dry ice blaster. The background is a dark blue brick wall.

Here comes the ice man!

Sand, water and abrasive media are a thing of the past. Dave Burbrink of the US company Cold Jet is revolutionizing cleaning with its dry ice blasters.



Dear readers,

Our roots are in Mulfingen, where we began more than 55 years ago. Today we have subsidiaries on every continent. One of the reasons why our company has become an international success story is that we are a global partner that knows and caters to local requirements. A prime example is our story about the Scottish cooling tower rental company Aggreko, which will take you from Scotland to the United States and China and finally back to Mulfingen.

To satisfy such local needs even better in the future, ebm-papst is making huge investments in new and existing subsidiaries. In Tennessee, we started up a new production facility for high-efficiency drive and ventilation solutions, something that is increasingly in demand in the American market. We also dedicated a new location this summer in Xi'an, China, where we manufacture fans for the Asian market.

For us, local also means expanding research and development and setting up laboratories in-country, so customers get the service they are accustomed to from Germany—but much faster. An example is the gas lab that we set up in Shanghai. With such activities, we are also supporting Shanghai's efforts to become a high-tech center.



Stefan Brandl

CEO OF THE
EBM-PAPST GROUP



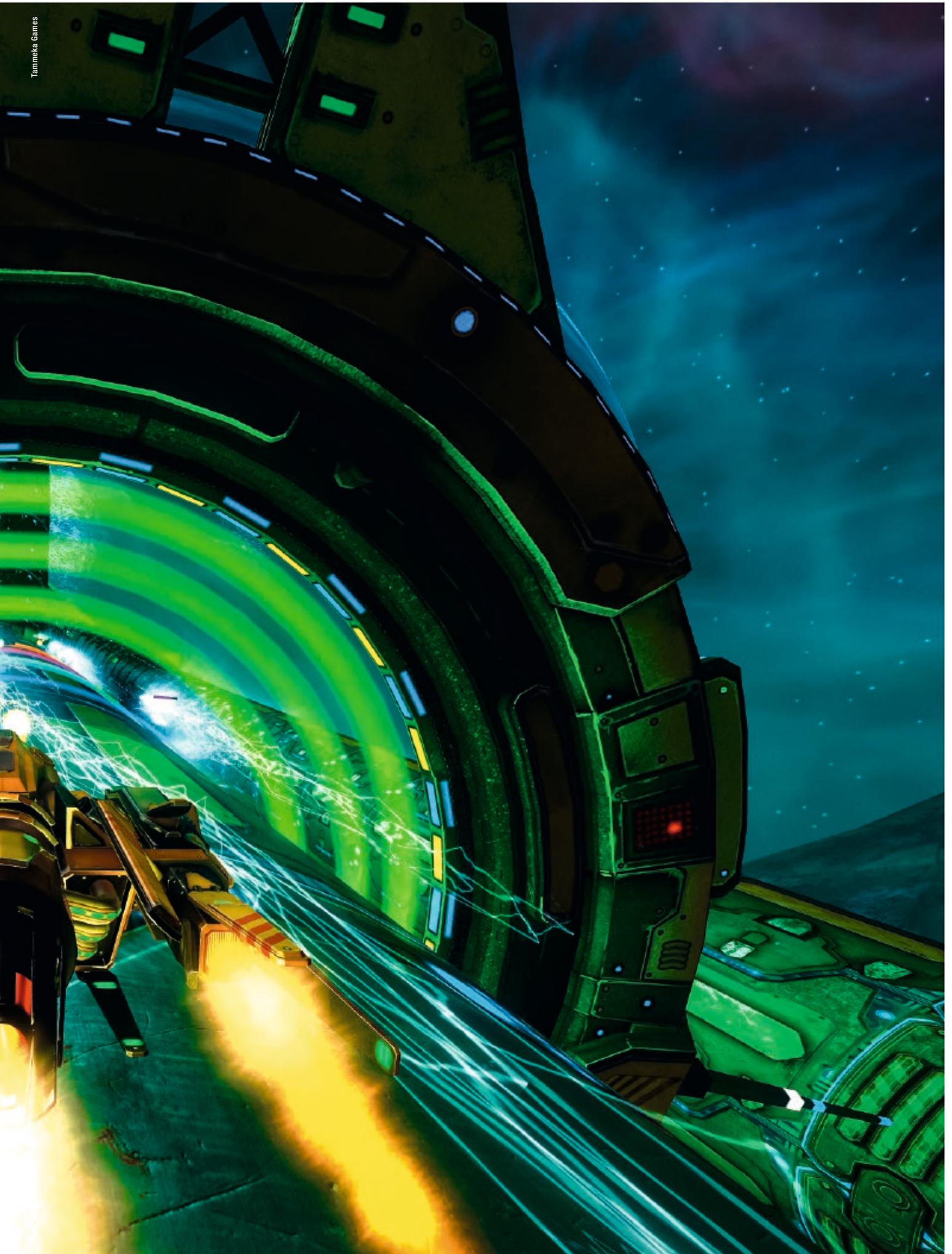
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The new ECI-42 modular system

Despite being everywhere you look, Virtual Reality (VR) is waiting for its big breakthrough in the gaming sector. It seems that there are VR headsets on every stand at trade fairs, however they are not as common as it first appears. VR game developers **AUSTELLA** wanted to bring another dimension to their already established racing game “Radial-G: Racing Revolved”. The idea was to produce a special wind simulating hardware, which enables the players to experience the feeling of driving at high speed. They collaborated with electronics supplier RS Components and ebm-papst in the UK during the development of the first VR gaming blower in the world. The solution blows a variable wind speed into the face of the player in line with the situation in the game. *You can read how the game designers came up with their wild idea and all about the technical details on the implementation in: mag.ebmpapst.com/radialg*



TammeKa Games







Many people dream of living sustainably at one with nature. Max Green has fulfilled this wish on a garden plot in the German state of Brandenburg. Green, a YouTuber and coach, lives with his family in a tiny house that includes everything needed for daily life within the smallest possible space — even a fully equipped bathroom with bathtub. To minimize water consumption, he had a **SEPRETT DRY TOILET** installed there. It uses a quiet ebm-papst fan with two-stage control that quickly and efficiently eliminates odors and humidity. *To find out how Max Green got his tiny house, visit mag online or his YouTube channel: mag.ebmpapst.com/tinyhouse; <https://bit.ly/1XNurzN>*

Paint, please!

Scratches in the car paint hurt. Especially if you have to put your vehicle in the workshop for a few days. Carheal's mobile paint booth puts an end to this. It removes scratches quickly and independently of location. It can be set up anywhere, for example in the supermarket car

park. Simply plug the various modules with integrated axial and centrifugal fans, filters and electronics together, connect the power and off you go. When you have finished shopping, your freshly painted car is ready to leave. ●
www.carheal.com

“Our customers get a full-service package”

Dr. Stephan Arnold has been CTO of the ebm-papst Group since July 2018. In our interview, he tells us what ebm-papst is working on.

What adjustments have you made in the past year?

We’ve reorganized our research and development with a clear focus on strengthening customer-specific applications. That’s a very important step for ebm-papst. We’re also making sure our products are ready for digitalization and the Internet of Things; we want to offer our customers an uncomplicated way to integrate them in their digital solutions as quickly as possible. And we’re constantly working to make our products even more efficient.

What exactly are your aims in application development?

One very important point is being able to supply customers with samples for their tests much more quickly. The second point is that we’ve made application development into a separate department. That makes it possible to focus much better on customer requirements. Third, we now have Dr. Roland Keber, who is responsible for these activities worldwide. So now international customers have a single partner for development issues.

Digitalization is a big deal.

What does it mean for ebm-papst?

First, it means that we equip our products with interfaces and functionality that enable them to communicate with our customers’ digital solutions. In a second step, that means we provide our customers with a digital infrastructure. For example, small air conditioner manufacturers can not only buy a fan from



Dr. Stephan Arnold is CTO of the ebm-papst Group.

us that communicates with their electronics, they can also access the data from that fan through the Internet. And they can program services and provide them to their customers via our servers. They get a full-service package from us. And at our neo start-up, we’re working to provide high-utility data. The first solutions are already in the starting blocks.

Products from ebm-papst are already highly efficient. How can they be made even more efficient?

For one thing, there are the possibilities offered by digitalization. With even more precise control, we can make our products even more efficient to use. That’s one of our aims with GreenIntelligence. Our research is also strongly focused on aerodynamics. We use state-of-the-art simulation methods that enable much more efficient solutions. And there’s also still potential for our drives. Optimized production technologies provide an efficiency boost for the motors and electronics in particular. ●



Looks impressive,
cleans impressive:
Solid carbon dioxide,
also known as dry
ice, makes clean
dreams come true.

COMPANY
Cold Jet

LOCATION
Loveland, Ohio, USA



Dry Ice blasting

Sand, water and abrasive media are a thing of the past. The American company Cold Jet is revolutionizing cleaning with its dry ice blasters.

For almost 25 years Dave Burbrink has been burning for dry ice—and for technical challenges. The PCS 60 contains a lot of engineering passion of the Cold Jet Technical Director.

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Cincinnati, on any Sunday in the early 1970s: The food on the table is steaming less and less, and little Dave is severely trying the patience of his parents; he is too absorbed to hear their calls. He has just found the right Lego blocks for his truck's hood. "I'm part of the first generations to play with Legos. Back then there were hardly any assembly plans for them, so if I wanted a certain thing, I had to figure out how to build it myself," recalls Dave Burbrink almost 50 years later.

Not much has changed since then. Burbrink can still forget his home city of Cincinnati, his workplace in nearby Loveland, the surrounding state of Ohio and the rest of the world around him when there is a technical problem to solve. That is still his passion. "The toys just got bigger," he says with a wink, meaning the challenges that became more and more demanding over the course of his career. Burbrink worked for 20 years as an external

product designer for Cold Jet. Four years ago, he became part of the engineering team, advanced to the position of Global Design and Technical Director and assumed responsibility for the global design of the company's ECaSP systems. ECaSP stands for Environmental Cleaning and Surface Preparation, but that does not really say anything about the company's cool main attraction; Cold Jet has been developing and producing industrial cleaning systems that utilize dry ice as the cleaning media since 1986. When cut and propelled at high pressure onto a dirty surface, the solid carbon dioxide cleans so gently and efficiently that it makes a lasting impression on observers. Burbrink was blown away himself when he came into contact with Cold Jet for the first time almost 25 years ago. "I was wearing sneakers with white rubber soles and had them blasted out of curiosity. After that, I knew that this is really something special," he says.





The hard way or the soft way? With the PCS 60, Cold Jet has for the first time developed a dry ice blasting system that allows users to choose between 28 particle sizes.

Cold Jet wants more

Dry ice, manufactured by repurposing carbon dioxide that is produced as a byproduct of industrial processes such as sugar fermentation in breweries, removes contaminants from surfaces, but does not leave any secondary waste of its own. Dry ice sublimates, or transitions from solid to gas, when it impacts the surface being cleaned. In addition, it is safe for the environment, non-conductive, non-toxic, non-abrasive and is safe and approved for use in foodstuffs. It can be extremely powerful, for example when used to remove tar from asphalt

pavers—or quite gentle, including cleaning debris from sensitive electrical equipment. “With a dry ice blaster, you can even remove the M from an M&M and it’s still safe to eat afterward,” says Burbrink, whose enthusiasm is reminiscent of the little boy marveling at his creations long ago.

But something crucial has changed since then. When in doubt, Burbrink no longer needs to come up with ideas completely on his own when working toward a particular goal. He has his team, and support from partners such as ebm-papst, which assisted with Cold Jet’s latest major success, the PCS®60 dry ice blaster. It reached the market



The PCS 60 works with three-millimeter dry ice pellets. They are poured in at the top.

Five drive units set the selected settings. Thanks to their IoT capability, the data can also be monitored online.

The intuitive control panel allows users to set the desired ice particle size, pressure and feed rate.

With a constant flow and a pressure of 20 to 300 psi, the PCS 60 blows the ice where it is dirty.

“The idea was to achieve the same results with less dry ice, less air and less noise in less time.”

DAVE BURBRINK — TECHNICAL DIRECTOR AT COLD JET

this year, kicking off the new Aero2® series. “The idea was to achieve the same results with less dry ice, less air and less noise in less time,” explains Burbrink. “We wanted to develop a machine with more functionality, and we wanted to make it smaller.”

Smart drives

That posed some tough challenges for Cold Jet’s product developers. They brought Craig Kovarik, an ebm-papst sales engineer, on board and discussed uncertainties about specifications such as speed and torque with him. “Craig and his coworkers

helped us to select the right specs,” says Burbrink. But of course it took more than just the selection of specifications to finish the job. “We needed drives that are able to cover a broad range of parameters. And we needed “smart” drives that can communicate to others via IoT about quantities like speed, amp draws or motor temperature. ebm-papst supplied us with this intelligence.”

The PCS 60 now uses five smart K4 drive units from ebm-papst that provide convincing performance and low power consumption. One drive unit transports the dry ice at variable speeds to the cutting mechanism and two drive the precision



cutting wheels. Another drive controls the separation between the cutting wheels so the size of the ice particles can be precisely controlled. The fifth drive unit transports the small or tiny dry ice particles to the air stream, which propels the dry ice particles at pressures between 20 and 300 psi (1.4 bar to 20.7 bar).

Hard or soft

Taken together, the result is a dry ice blaster that satisfies all of Cold Jet's requirements for the new machine and includes 28 dry ice particle size options. At the highest level, the PCS60 utilizes three-millimeter dry ice "pellets." At the lowest level, the three-millimeter pellets are cut to micro-particles that are 0.3 millimeters across. This type of precision allows users to find the most effective set-

ting for each unique application. This aspect also enables the user to clean a broad range of applications, from aggressive to very gentle cleaning.

"The range of applications that this makes possible is unbelievable," says Burbrink. For example, the PCS60 can cut a wooden plank or remove the print from a business card. "All with one machine," says Burbrink with unbridled enthusiasm. Thus far, users did not have the choice of using the same blaster to remove graffiti or clean off injection molds. "Injection molds are very sensitive to surface contaminants. If you touch one, a fingerprint could be left behind that could end up on a plastic part. So it's correspondingly hard to clean these molds without damage. But we can do this with our equipment," says Burbrink—his eyes gleaming just as they did when he was a kid solving Lego problems. ●

The dry ice blasters from Loveland go to customers in a wide variety of industries. Because where cleaning must be residue-free and food-safe, dry ice is ideal.

WATCH THE VIDEO ABOUT THE DRY ICE BLASTER IN ACTION AT:

mag.ebmpapst.com/coldjet

“All you need is a screwdriver”

COMPANY
HSB

LOCATION
Västerås, Schweden

Jan Holmström is regularly to be found on the roofs of Sweden. The engineer is busy installing fans there — and knows the pitfalls of this profession.





Mr. Holmström, what are the challenges of your job?

I install fans of different sizes, depending on how much air they're to move. Replacing old fans with new ones has to be quick. It's therefore important for both me and my staff that the handling of fans is as simple as possible. The biggest ones weigh around 70 kilos, and roof openings are often too small. Conventional solutions involve using a crane.

That sounds like hard work ...

Yes, but we've now started using roof fans from ebm-papst in Sweden. They're really easy to handle. If they don't fit through the roof opening in one piece, you can simply take them apart and just put them back together again afterwards. This way we don't need a crane. And they very rarely get anything wrong with them. Other manufacturers can't offer such quality. And the price is of course also fine—the whole package is just great.

What's the procedure or installation and connection of the fans?

For installation itself we often only need a screwdriver. We're replacing the fan with the same size, and ebm-papst fans are a real plug & play solution. There isn't actually much to connect

up. We can replace that sort of thing in max. four hours—often far quicker. I also regularly use the preconfiguration service for the fans. This means I give ebm-papst the necessary values—for example, the number of liters required per second. They then tell me the right size.

How many roof fans have you installed to date?

By now we must have installed some 40 or 50. We generally fit ten or so a year. As we work on private homes, it's not particularly regular. We sometimes install fans in ten houses, and then sometimes only two—you just can't say. It's around ten a year.

Do you often have to persuade the owner of the building?

No, sometimes it's the owners who come to us and say they need new fans. In some cases I also see fans are old when servicing them on site and then speak to the owner myself, telling them they could save such and such an amount of energy if they had a new one installed. An engineer from ebm-papst will often come and measure up the old fans. The engineer then writes a report detailing how great the potential savings are. The report also shows when the investment will have paid for itself. ●

“For me and my staff it's important that the handling of fans is simple.”

JAN HOLMSTRÖM

VENTILATION
ENGINEER AT HSB



Motor: direct drive GreenTech EC integral motor
Power: 27 W—2.75 kW
Size housing: 432 mm
Size lower frame: 592—992 mm
Air flow: up to 1,800 m³/h



Jan Holmström works as a ventilation engineer in Västerås for HSB, a big company in Sweden. Göran Andersson, sales manager at ebm-papst in Stockholm (left), often supports him in measuring the roof top fans. Jan and his staff install about ten roof top fans a year.



COMPANY
Audi AG

LOCATION
Ingolstadt, Germany

THREE FOR THE A6

The fifth-generation Audi A6 once again combines sportiness and comfort. Components from ebm-papst ensure lower emissions and more driving fun.



POWER STEERING MOTOR: MORE COMFORT; MORE AGILITY

A premium feature of the Audi A6 is active steering that uses a power steering motor from ebm-papst. In this system, an additional shaft goes directly to the steering shaft, changing the steering gear ratio depending on the speed. Benno Kilzer, Head of Sales Automotive at ebm-papst, says: "In urban traffic and when parking, the steering is very smooth and easy. At higher speeds, it gets very direct and gives the driver high agility and lots of driving fun."

Since steering is safety-relevant, the reliability of its components has top priority, which is guaranteed by great ruggedness and the hollow-shaft motor used by ebm-papst.

ORBITAL PUMP: EQUIPPED FOR COLD

As part of the AdBlue system in the Audi A6, an orbital pump from ebm-papst helps to considerably reduce nitrogen oxides in the exhaust. The pump delivers the urea-based fluid from the AdBlue tank to the exhaust system, where it is injected into the exhaust upstream of the catalytic converter. The orbital pump has a feature that makes it especially valuable in this application: it can pump in two directions without additional valves. That is important because AdBlue crystallizes at low subfreezing temperatures. When the engine is switched off, the orbital pump returns the AdBlue from the hoses back to the AdBlue tank so that the liquid cannot freeze in the hoses.

ebm-papst supplies the orbital pump as a module including the drive, pump and electronics. Benno Kilzer says, "Besides pumping in two directions, it also has another big advantage. Since it's a diaphragm pump, it can't freeze. A frozen medium can expand inside the pump without damaging it."

OIL PUMP: RELIABLE AT MAXIMUM LOAD

In the Audi A6's seven-speed transmission, a motor from ebm-papst provides faithful service. While oil pumps for the automatic transmission used to be driven directly by the combustion engine, automakers today use electric pumps. This switch is what makes modern features such as automatic start/stop systems and gliding possible, because the transmission can shift even when the combustion engine is not running. And if the combustion engine is not running, that reduces CO₂ emissions—an important concept for modern cars.

The ebm-papst motor in the pump has to satisfy exacting requirements. Benno Kilzer explains: "The oil pump runs in the oil sump, the part of the transmission that is always submerged in oil. The motor has to withstand this transmission oil and also the high temperatures of up to 160 degrees."

The motor can do that thanks to a combination of materials and design exactly tailored to Audi's requirements.

COMPANY

Solidpower GmbH

LOCATION

Heinsberg, Germany

ELECTRICITY? WE MAKE IT OURSELVES!

The BlueGEN BG-15 micro CHP system from Solidpower uses fuel cells to generate electricity and heat from natural gas. And it does it very economically thanks to its uniquely high electrical efficiency.

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The unit is somewhat larger than a washing machine, but much fancier with its dark gray and black surfaces and shining blue LED display. But as is so often the case, outward appearances are not what matters. In continuous operation, the BlueGEN BG-15 fuel cell unit generates about 13,000 kilowatt-hours of low-emission electricity per year. And since waste heat results from the conversion of natural gas to electricity, the power plant also generates up to 250 liters of hot water per day.

Cool improvement

Clean electricity is a key issue for the future, and interest in green energy is growing. So decentralized power generation using combined heat and power systems is gaining in importance. For Frank Dahlmanns, product manager at Solidpower GmbH in Heinsberg, Germany, solid oxide fuel cell technology is one of the most promising candidates among future models for electricity generation. He



says, “With the natural gas-powered BlueGEN family, it has been possible to achieve a considerable shift in the efficiency ratio for the first time. Thanks to their high electrical efficiency of over 55 percent, the units can — in contrast to motor-driven micro CHP systems — operate continuously and produce enough electricity for private homes and medium-sized commercial buildings.” Solid oxide fuel cells (SOFCs) convert natural gas into hydrogen-rich process gas from which electricity is produced through an electrochemical reaction — the fuel cell reaction. The rugged design of the fuel cell stack in the BlueGEN BG-15 makes it possible to modulate the output.

“Users can send their personal load profiles via a cell phone app and a Web app to the system to control it,” says Dahlmanns. “Depending on requirements, they can operate the BlueGEN BG-15 at outputs from 500 to 1,500 watts.” So its output can be reduced during vacations and increased again to

recharge the battery in an electric car. The reduction of the exhaust gas temperature to less than 120 degrees is an important improvement in the unit. Reducing the exhaust gas temperature enables the use of conventional plastic exhaust systems like those typically used in gas burners. That makes installing the BlueGEN BG-15 easier. Dahlmanns says, “That’s an important aspect for marketing the unit, because heating installers are important multipliers for us. They’re the ones who ultimately recommend our product to end customers.”

Clever mixing

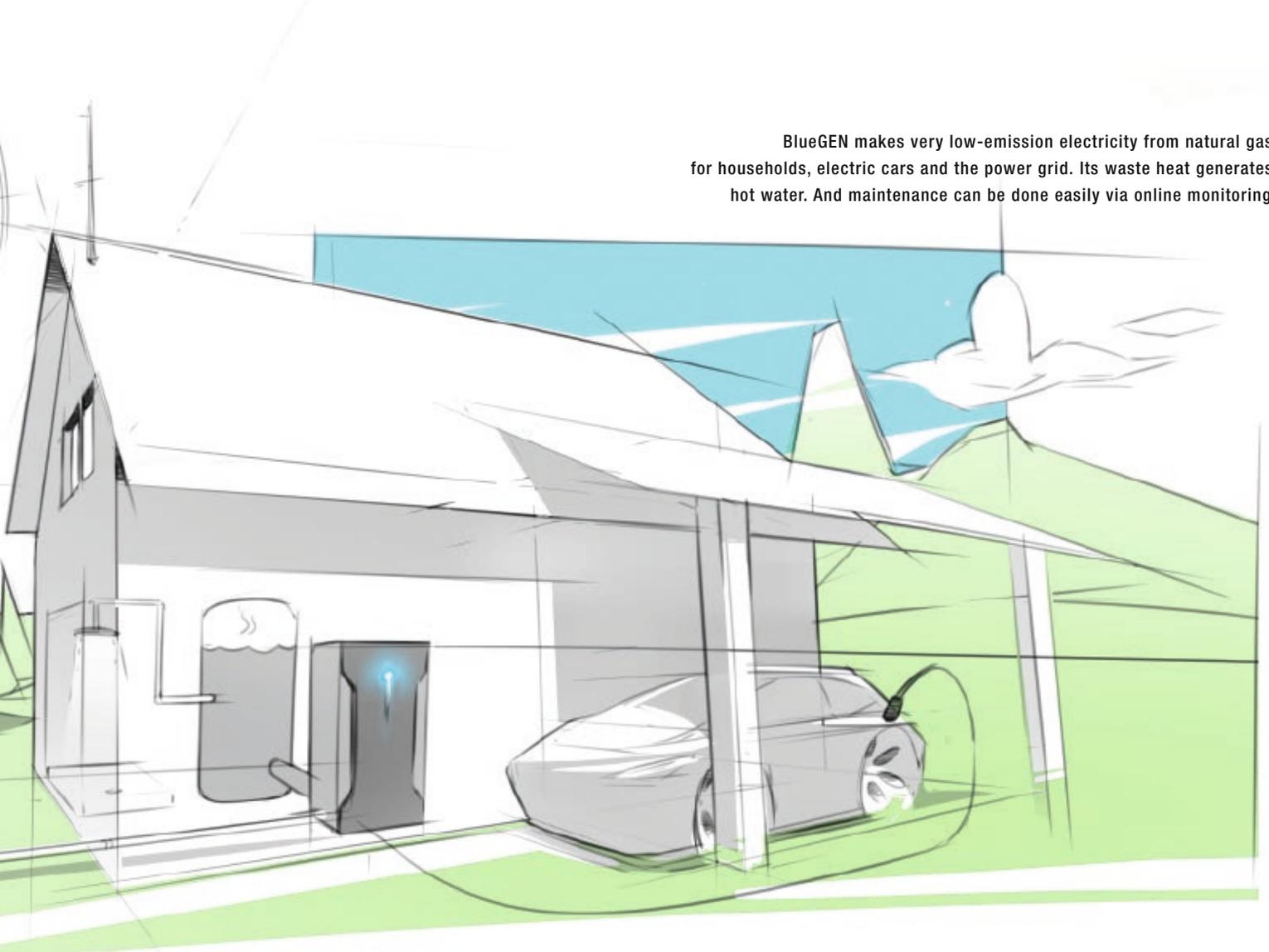
Fans from ebm-papst play an important role in both reducing the exhaust gas temperature and supplying the process gas. Dahlmanns says, “We’ve been using NRG118 EC centrifugal blowers since we began to develop the BlueGEN technology. They’re powerful and rugged, characteristics that are indispensable

for continuous operation.” One of the centrifugal fans makes sure that the exhaust gas temperature remains below 120 degrees. The other supplies the air for the electrochemical conversion process in the fuel cell stack and cools it at the same time. The supplied control valve with stepper motor regulates the amounts of reaction and cooling air with a 3/2-way valve.

Gas for the future

With its improvements in BlueGEN technology for a modulated power generator for continuous operation, Solidpower overcame several challenges for future-proof power supply models. Now it is time to establish the conditions for making the BlueGEN BG-15 more attractively priced independently of state subsidies. Dahlmanns says, “We’re working on the service life of the units and of course on establishing fuel cell technology as green technology.” ●

BlueGEN makes very low-emission electricity from natural gas for households, electric cars and the power grid. Its waste heat generates hot water. And maintenance can be done easily via online monitoring.



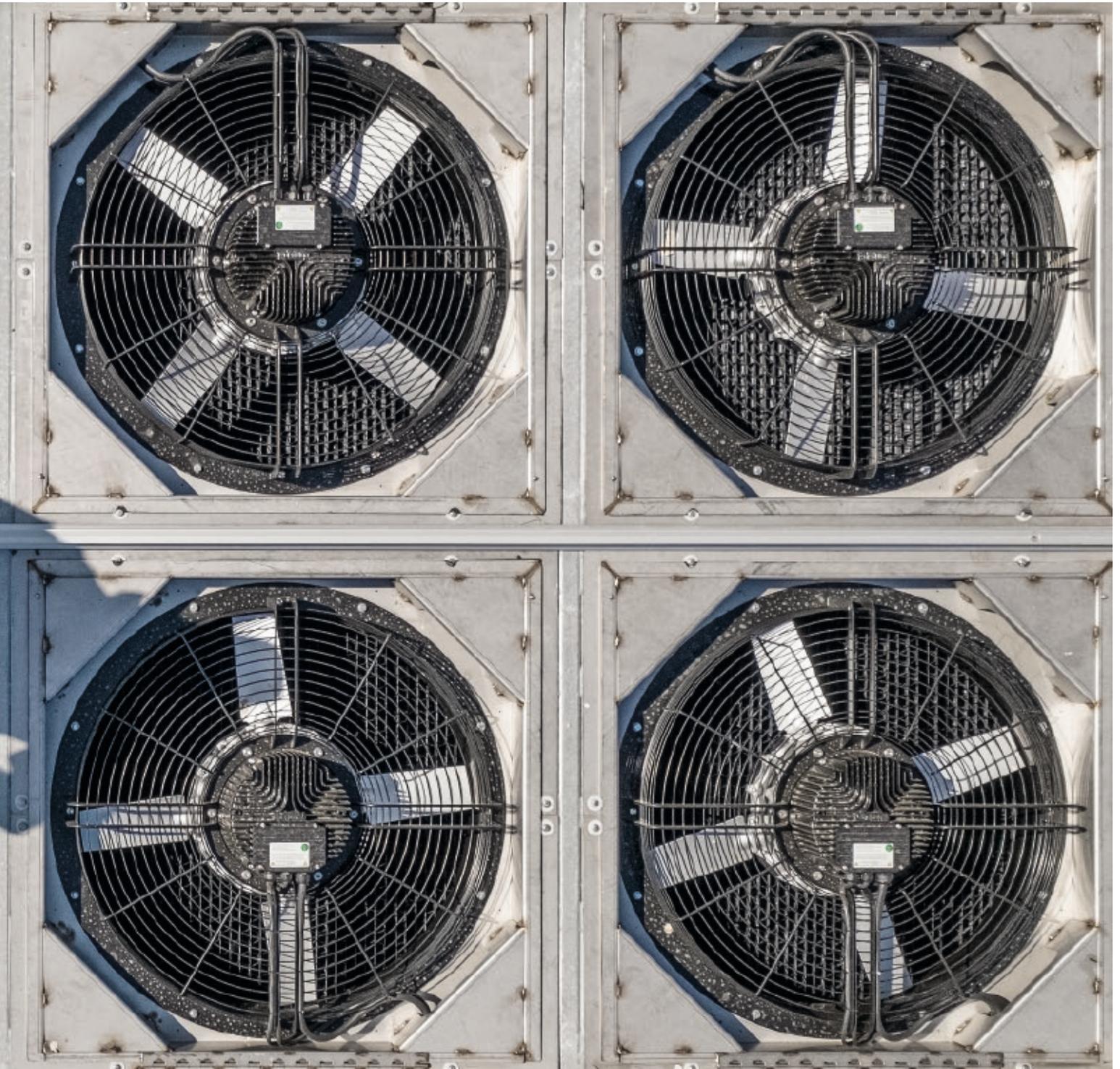
COMPANY
Aggreko PLC

LOCATION
Glasgow, Scotland

Rent-a-tower



What to do when your refinery's cooling tower is undergoing maintenance?
Right! Call Aggreko—global market leader in cooling tower rentals.





Billy Childers takes care of Aggreko's U.S. customers from his office near Oklahoma City. The biggest cooling towers are being put to use in the United States (left).

Ready to ship: Built as intermodal containers, the cooling towers reach customers by ship, truck or plane (right).

A familiar problem: It feels like 40 degrees in the shade and you are sweating in the office when suddenly the fan stops working. Luckily, replacing it is not that big of a problem. It is a different matter for the cooling towers used in industrial applications. They are often as large as a small apartment and not so easy to replace. That is where Aggreko comes into play.

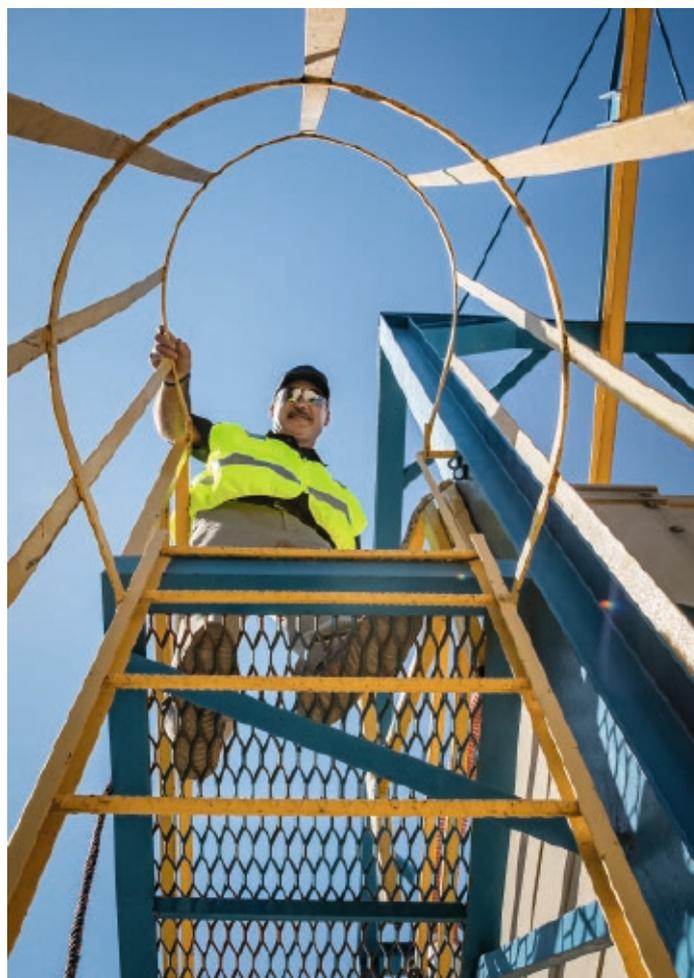
Global rentals

Wherever process heat is generated and customers are unable to fall back on equipment of their own, Aggreko is not far away. The company, with headquarters in Glasgow, Scotland, specializes in renting cooling towers for any duration or schedule, be it short-, medium- or long-term, among other products. "We're there when somebody needs to perform maintenance or repairs on a cooling tower, whether it's in an oil refinery, a

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steel mill, a power plant, a hospital or a university," says Billy Childers, National Manager at Aggreko USA. Aggreko has its cooling towers produced by partner companies in China and the United States. They reach customers by ship, airplane or truck. Aggreko was founded in the Netherlands in 1962. After the company had been in business for more than 50 years, it became clear in 2017 that it had to reposition itself in the rental market for cooling towers.

Two factors played a major role in this decision: transporting the cooling towers, and using them. Aggreko's fleet consisted of 14 different cooling tower models, which caused problems because they were not designed for containerized transport and took up too much space on-board ships and aircraft. And of course that costs money. "Transporting a cooling tower by ship cost us about 25,000 dollars," says Billy Childers. Frequency variations from country to country also posed a



challenge to providing a standardized solution for trouble-free operation worldwide: the U.S. power grid usually operates at 60 Hz, the European and Asian grids at 50 Hz.

New focus: keep it simple

Aggreko initiated a project called Global Towers, reducing its fleet to two new models, both of which are designed for container transport and differ in size and capability: the GT40 and the GT20. The number stands for the container size in feet. A smaller size is planned for the future. “Now transporting a cooling tower by ship only costs us about 2,500 dollars,” says Billy Childers.

At the same time, Aggreko switched from AC fans to EC fans, which can be adjusted better to various partial load ranges and also operate more efficiently. It also wanted the ability to query performance data remotely, something only new

“Transporting a cooling tower by ship only costs us about 2,500 dollars.”

BILLY CHILDERS

NATIONAL MANAGER
AGGREKO USA

EC fans could do. Aggreko chose a few potential suppliers, including ebm-papst. “We received a request to produce a prototype,” recalls Daniel Yiu. As Regional Manager Sales at ebm-papst, he is responsible for southern China and Hong Kong and was in close contact with the Chinese cooling tower manufacturer. “This project was very important for us because Aggreko is such a big customer. We wanted to offer the best possible product.”

International cooperation

After ebm-papst Mulfingen designed and built the prototypes, Yiu arranged for measurements of the fan in a cooling tower. An intense period of discussions across multiple time zones and countries began. “We were in touch every day,” recalls Yiu, “at first with the cooling tower manufacturer and later directly with Aggreko when



Aggreko PLC

Founded in 1962 as a rental agency for generators, Aggreko expanded their portfolio with power heating, cooling and compressed air solutions later. Today, the company owns a fleet of up to 600 cooling tower units and has more than 204 subsidiaries all around the world.

GT-40

18 specially designed fans get to work in the GT-40. The smaller model, the GT-20, houses eight fans.



it was time to adapt the required specifications.” Such an Aggreko cooling tower has to deliver high performance—at ambient temperatures of up to +60° Celsius since many of the towers are used by customers in the Middle East. The same applies for its key components, the fans. Not only are they subjected to high temperatures, they are also exposed to constant humidity since they work with evaporative cooling. But the biggest challenge for ebm-papst was that the fan had to cope with the high back pressure resulting from the compact, container-based design.

Impressed by the supplier

In the end, Aggreko got a rugged fan with H2+C design; its special coatings and paints make it corrosion-resistant, it can handle operating tempera-

tures as high as +80° Celsius, and it resists high back pressures. Billy Childers is satisfied, saying “Our previous AC models needed a lot of maintenance in the hot, humid environment where they are used. The failure rate was very high. We’re convinced that that will change with the products from ebm-papst.” Childers values the good international cooperation. He says, “There were lots of meetings and talks, and they weren’t always fun. But ebm-papst was always available—on the phone, in person or in some other way. Not every company can guarantee that at this global level.” ●

FIND MORE INFORMATION ABOUT AGGREKO AT:

mag.ebmpapst.com/aggreko

COMPANY
Magic FX

LOCATION
Boxtel, The Netherlands

Partying until the sparks fly

Concerts, festivals and sports events would only be half as much fun without impressive special effects. But since lots of regulations must be complied with for pyrotechnics, Magic FX focuses on other visual effects—as it did with its latest product, the Sparxtar.





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The Netherlands enjoy an outstanding reputation among fans of electronic music. Famous DJs launched their careers there, and tens of thousands of people party at festivals throughout the country every year. The fans want to do more than hear beats and melodies, they also want to see sparks, confetti and soap bubbles. This is exactly the part of the spectacle that Magic FX, which is based in the town of Boxtel, specializes in. It produces machines that turn events from concerts to soccer games into special-effects spectacles. “Our team loves music, festivals and events,” says operations manager Wouter Hoex. “Many of our people play in bands themselves, work as DJs in their free time, or simply like to go to concerts.” A look at the 40-strong team underscores his words; its average age is 29.

Since the Magic FX employees know from their own experience how much special effects contribute to the atmosphere at live events, they focus in their daily work on high-quality products like their latest special-effects unit, the Sparxtar. It sprays sparks at heights of two to five meters, and users can control the duration and rhythm of spark emission. Hoex explains how Sparxtar works: “The unit heats metal powder up to well above 500

“Our effects are safe and can be much more precisely controlled than pyrotechnics.”

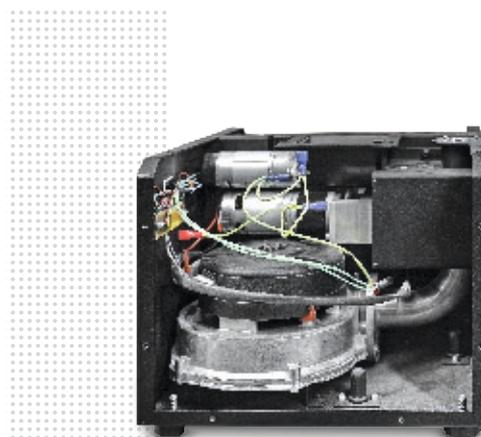
WOUTER HOEX

OPERATIONS MANAGER
MAGIC FX



LEFT: Short delivery times are especially important for Magic FX's customers, so the company keeps its products on hand in a large warehouse.

RIGHT: Wouter Hoex (right) is part of the young team at Magic FX.



A blower from ebm-papst in the Sparxtar makes sure the sparks really fly.

degrees. Together with the oxygen which works as a catalyst, that causes the powder to spark. A fan blows the sparks into the air.”

Effects without pyrotechnics

For a long time, precise control of special effects from the lighting control board was not a matter of course, as Hoex explains: “Pyrotechnics were often used in the past to generate certain effects at events, but that has been much more strictly regulated since the early 2000s following serious accidents, and rightly so. So nowadays many event organizers use visual effects from other sources. They’re not dangerous, so they don’t require special authorization, and they’re also much easier to control.”

Even when events do without real fire and explosions, the effects should not be any less spectacular. So an important requirement remained a certain height for the effects so that the spark machines would be noticed even on big stages. In the Sparxtar, the RG 128 centrifugal blower from ebm-papst blows the sparks upwards. Hoex and his team chose the product because they had already had positive

experiences working with ebm-papst on an earlier project. “We were looking for a very reliable product for this application. Nothing is more annoying than a special-effects machine that fails at a crucial moment. And the blower has to be small because the entire unit has to be compact and unobtrusive on stage,” says Hoex.

On and off fast

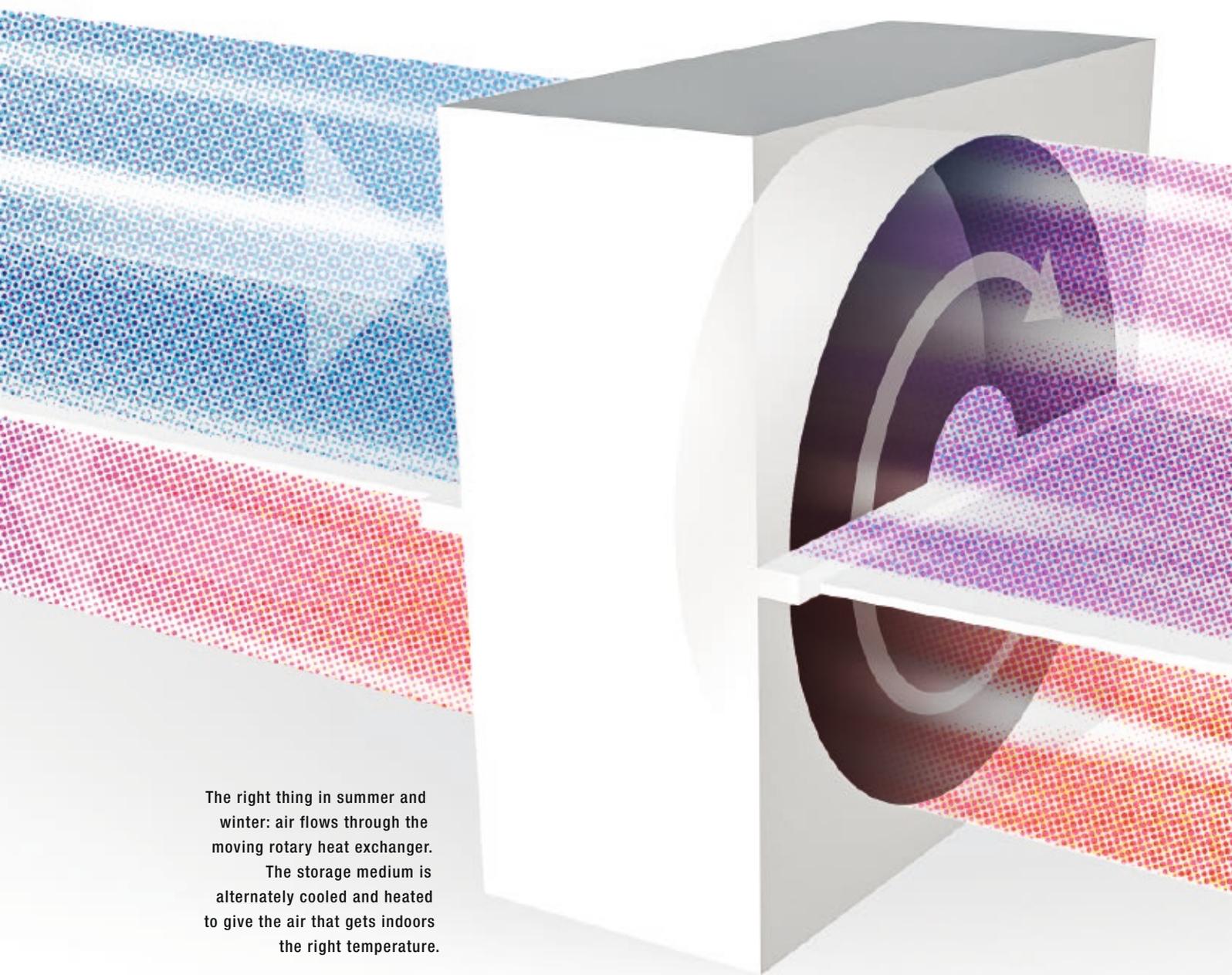
Given these requirements, ebm-papst provided various products to Magic FX so that the company could test them in real-life conditions. “The RG 128 won out because in addition to the main requirements, it can also be turned on and off fast,” says Hoex. “That’s important because only precise control enables precise effects.” Customers seem satisfied with the result. In the first two months after it reached the market, 400 Sparxtar units were sold. So far it has been used at the Eurovision Song Contest in Tel Aviv and at other major concerts. “The Sparxtar is a completely new equipment category and makes safe and impressive sprays of sparks,” enthuses Hoex. “We hope we can provide sparkling highlights for many more events with it.” ●

COMPANY
Systemair

LOCATION
Skinnskatteberg, Sweden

Tweaking the temperature

Rotary heat exchangers from the Swedish company Systemair provide for a pleasant climate indoors.



The right thing in summer and winter: air flows through the moving rotary heat exchanger. The storage medium is alternately cooled and heated to give the air that gets indoors the right temperature.

W

When someone can stand in his living room and shrug off record-setting heat waves and extreme winters with equal indifference, maybe that is because there is something going on in the walls. In residential ventilation systems, rotary heat exchangers are responsible for ensuring that the incoming air has the right temperature. "Air from outdoors is heated in the winter and cooled in the summer. The fans force the air, and also the exhaust, through the rotor. And heat exchange takes place because of the rotor's rotation," explains Nerijus Lapackas, head of engineering at Systemair.

Systemair, which employs more than 5,000 people, produces more than 23,000 ventilation units annually at its factory in Ukmergė, Lithuania. Half of them go to Norway and the rest reach the market through big distribution centers in Sweden and Germany. The engineers at Systemair put a lot of energy into making sure their products consume little of it, and they voluntarily have them certified by Eurovent, an industry association. "We place great value on quality, service and cooperation with our suppliers," says Lapackas.

No more complaints

There were quality problems four years ago. "The rotor drive was no good. We got quite a few complaints," says Lapackas. Besides, Systemair wanted to set itself apart from its competitors better. "We wanted to distinguish ourselves by making the rotor speed adjustable," adds Lapackas.

So Systemair decided to use rotor drives and fans from ebm-papst in its residential ventilation units. After adjustments to Systemair's requirements, for example regarding speed, for about two years now a VDC-3-49.15 drive with integrated electronics keeps the rotor running for more than 70,000 hours. "That was the best decision," says Lapackas. Since then there have been no complaints at all. "Now we can also control the efficiency of heat recovery and the moisture transfer, and there's also the lower energy consumption," summarizes Lapackas, who has much more than just a shrug for the new drives, finding them: "Just perfect, perfect, perfect." ●

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November 26–28, 2019

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Mumbai, December 4–6, 2019

AHR, *Orlando*,
February 3–5, 2020

EuroShop, *Dusseldorf*,
February 16–20, 2020

Acrex, *Delhi*,
February 27–29, 2020

Expoenergy, *Wels*,
March 4–8, 2020

Climate World, *Moscow*,
March 10–13, 2020

Mostra Convegno, *Milan*,
March 17–20, 2020

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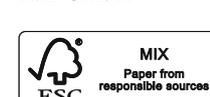
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$$THD_I = \sqrt{\sum_{h_2}^{h_{max}} \left(\frac{I_h}{I_1}\right)^2} \times 100\%$$

Current harmonics are a burden for the power grid and the budget. Instead of going to great lengths to reduce them, it is best to avoid them altogether.

The need for data centers is growing worldwide, just like the quantities of data to be processed and the power density of the individual components. In spite of this trend, the average annual power consumption for air conditioning in data centers fell by eleven percentage points in the past ten years, mainly due to the increased use of adjustable and efficient EC technology in fans.

Modern motors are operated with variable frequency drives to exactly adjust their speed to requirements, which results in nonlinear currents. A non-sinusoidal current curve arises, which can be represented as a sum of sinusoidal curves with frequencies that are an exact multiple *h* of the fundamental frequency. This is total harmonic distortion (THD_I), which is given in percent. A THD_I of 33 percent means that in addition to the 100 percent total active current, a 33 percent distortion reactive current is lost. The current harmonics also result in a heavy load on the supply network, disturbances, and high maintenance and replacement costs. So the aim is to minimize THD_I. That

is usually done with external passive or active filters that are barely able to reach a single-digit THD_I value even with very high development and validation costs. They also involve other disadvantages such as space requirements, high system complexity, or high procurement costs. The best approach is to prevent harmonics from arising in the first place.

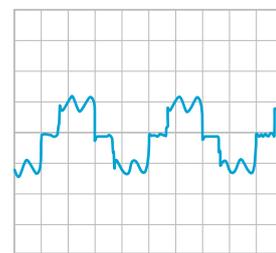
To do so, we developed the integrated 3-phase active PFC solution. “Active rectification” causes the input current to be sinusoidal instead of pulsed, with the current curve shifted so that the current level and voltage are in phase. The power factor λ is an important parameter, describing the ratio between effective power and apparent power. A value of $\lambda = 1$ is considered optimum. By filtering the harmonics, the 3-phase electronics with active PFC in the RadiCal and RadiPac series of EC centrifugal fans reach $\lambda = 0.99$ and a THD_I value of less than five percent. Compared with the industry standard, active PFC technology reduces the costs for the required energy supply components by about 38 percent. ●



Bernhard Siedler, Team Leader Air Conditioning, ebm-papst Mulfingen

CURRENT WAVEFORMS COMPARED

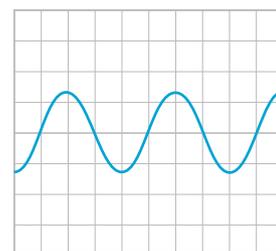
Current waveform with passive PFC



U1	400 V/50 Hz
I1	4.25 Arms 6.9 Apeak
P1	2.825 kW
Q1	1.00 kVA
S1	2.99 kVA
LF	0.94
THD _I	33.5%

ebm-papst series product:
Power factor (λ) = 0.94; THD, 33.5%

Current waveform with active PFC



U1	400 V/50 Hz
I1	4.1 Arms 6.0 Apeak
P1	2.82 kW
Q1	0.08 kVA
S1	2.82 kVA
LF	0.998
THD _I	≤ 5%

New ebm-papst product:
Power factor (λ) = 0.99; THD, ≤ 5%



Testing in China

Germany and the United States have gas labs, and now China has had one of its own since 2018. That enables us to address local requirements even more effectively.

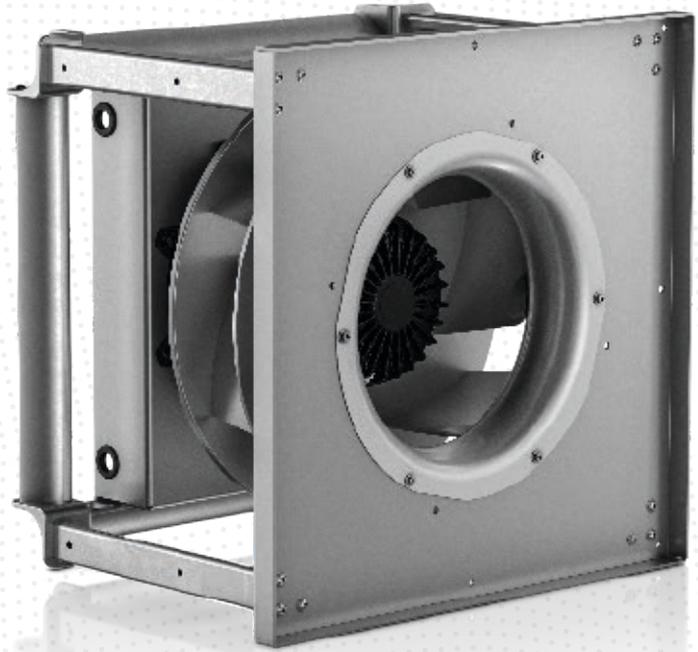
Who knows the Chinese market for heating equipment best? The Chinese themselves, of course. Given that, it was logical for the ebm-papst site in Shanghai to get its own gas lab, in which the interaction of the fan, gas valve and venturi, the crucial components for combustion in condensing boilers, can be precisely tested. In the past, such tests took a detour via Germany. Ji Wang, the responsible application engineer, says: “Now we can systematically develop products that are an even better fit to local requirements.” Customers can deliver existing or newly developed equipment to the gas lab for testing to assist in the design of gas-air units. The aim is to get the best and most efficient combustion while also complying with the requirements of legally stipulated standards. “Many manufacturers don’t even have the equipment needed for performing such tests,” says Wang. On the three test benches at the lab, the engineers measure emissions, such as

CO₂ or oxygen concentration, pressures and electric parameters such as motor current. Depending on the test stand, condensing boilers with output of up to a megawatt can be tested. The measurements help to precisely configure the fan, gas valve and venturi to precisely match the customer’s equipment. Test durations vary depending on the task at hand. For adjustment of a gas valve, half a day may be enough. Comprehensive tests can take up to three days. The Chinese gas lab is based on the one in Landshut, which has been in operation since 2006. “We use the same test methods. The combustion technicians from Germany helped us with the setup,” says Wang. There is already a tangible example for China’s new independence; thanks to the lab, the engineers there were able to develop a venturi specially for the Chinese market. “Now we’re closer to our customers and can react to their needs more quickly,” says Wang. ●

WITH HIGH PRESSURE

In complex or narrow air ducts and also in air-handling units with filters, fans have to overcome high back pressure to move air. The new RadiPac centrifugal fans build up a head of up to 2,500 pascals. They need little space for installation, are quiet and highly efficient, and are easy to install.

ebmpapst.com/highpressure



KITCHEN AIR PURIFIER

This dual-inlet centrifugal fan combines high performance with top efficiency, smooth speed adjustment and low weight. The VHD 146 can be equipped with a non-return valve—and its activated carbon filters are easy to attach thanks to a bayonet connection.

ebmpapst.com/vhd146



THERE IS A SMALLER WAY

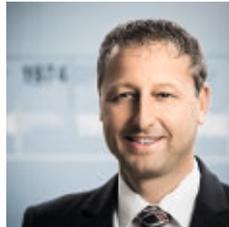
The successful AxiBlade series is now available in sizes 630 and 710. These small AxiBlades enable a noise reduction of up to 4 dB(A) at a static efficiency of up to 53 percent and air flow of up to 25,000 m³/h—the axial fan benchmark for evaporators, condensers and heat pumps.

ebmpapst.com/axiblade



“Implementing drive solutions in no time”

With the new ECI-42 modular system, users can put together a customized drive solution by combining separate modules.



Johannes Moosmann, Director of the Industrial Drive Engineering business unit at ebm-papst in St. Georgen, explains what is new and what the benefits are.

Mr. Moosmann, what's new in the ECI-42 modular system?

We've completely redesigned the system and added lots of details and features. For example, we now offer magnetic incremental encoders and industrial grade plugs for easy electrical hookup for the configurable drives with 42 millimeter diameter and IP54 degree of protection. We've designed the radial angled plug with bayonet connector so it can be rotated and snaps into place automatically. An axial plug module is also available for applications where space is at a premium. Even a preassembled cable connection is possible.

And the drive itself?

The extremely compact, electronically commutated internal rotor motor with 42 millimeter diameter and efficiency of up to 80 percent is still at the heart of all configurations. It's available in different power outputs, transmission designs and reduction ratios, with or without encoders or brakes. What all of the drives have in common is high power density and long service life.

Which users should find the system particularly interesting?

Lots of them, because these industrial-grade drives are ideal for practically all applications that require energy-efficient small

drives, for example industrial automation and packaging systems, but also for lab and medical equipment. Integrating the encoder, brake and transmission for automated access control—intralogistics applications—enables very precise positioning of the drives for things like precision lifting applications.

What makes the system so remarkable?

It's an answer to customer requests for compact, smart drives for a wide range of purposes. And it provides customers with a number of advantages: faster volume deliveries, more cost-efficient solutions, a high level of quality, and a customized solution. Using the modular system, customers can assemble a drive solution that best suits their needs. This enables us to circumvent the otherwise lengthy development phase typical of a specific product. Selected drive configurations, which we call preferred types, are ready for shipment within 48 hours, which means that sampling, for example, can be done very quickly. ●

YOU CAN FIND MORE PRODUCT INFORMATION ABOUT THE ECI-42 MODULAR SYSTEM AT:
ebmpapst.com/eci

PRECISE

Integrated encoders, brakes and transmissions enable precise positioning.

The drives in the 42-millimeter modular system have an efficiency of up to

80%

compact

The drives have enormous power density and need little space for installation.

quiet

Since they run very smoothly, the drives make no unpleasant noises.

WOULD YOU HAVE RECOGNIZED IT? — THE NEW ECI-42 MODULAR SYSTEM ENABLES CUSTOMIZED DRIVE SOLUTIONS. TAKE A LOOK INSIDE! ↑

