

magazine

INTERNATIONAL ENGINEERING SOLUTIONS

FANCY TRUCK

Highest quality and precision for mass production: Our seals and spring bellows for the active aerodynamics of the best-selling pickup truck.

FRESH FRUITS

Our gas sensors regulate oxygen and humidity in storage facilities so that apples and the like ripen to the point - regardless of the season.

PLEASANT JOURNEY

Our rubber-metal components dampen vibrations in Korean high-speed trains - also thanks to intercultural competence.



Editorial



Dear Customer,

It's said that every crisis is an opportunity in disguise. There is no doubt that we are all missing "real" customer contact – and face-to-face contact is very important to us. But, we are also making the most of this time to look inwards and continue to make changes – for the benefit of our customers, of course. We want to stay ahead of the game as new trends emerge in your markets.

As digitalisation and Industry 4.0 are ushered in, we are operating at the forefront with Angst+Pfister Sensors and Power and new solutions. That's why our 2022 magazine is dedicated to sensor technology and electrification. Read, for example, how we use gas sensors to record and regulate air quality to make food last longer and make sure less of it is wasted! Learn how, in an effort to reduce exhaust emissions, we are also making electric motors for industrial applications attractive for SMEs and small companies!

We are fast amalgamating sensor technology with our traditional materials expertise. Together with eminent Swiss research institutions, we are developing new smart technologies: "Sensing materials" allow, for example, our components to signal when their service life actu-

ally is coming to an end, keeping them in use even longer. Working with electroactive polymers as "artificial muscles" is no longer a distant dream for us. We are on the ball and investing more.

Developments like these make us more attractive as an employer. We want to continue having leading experts among our number. That's why we maintain professional contact with colleges and universities and also integrate aspiring engineers into our projects. Their ideas today sow the seeds for exciting development projects in our teams.

The introduction of high rpm electric engines for cars has upped the demands made on antivibration technology. In turn, to continue to guarantee excellent engine insulation, we have developed innovative products on new test rigs with advanced software. We are also constantly on the move in production technology – most recently incorporating computer-aided tool design: We have been simulating the flow of elastomers while viscosity, pressure and temperature constantly change. In this way we reduce development timeframes and optimise the process.

Our motto is "never stand still" when it comes to global approvals for our products. Recently, we also broadened our expertise in the sustainable recycling economy and corresponding approvals.

We have also expanded our Sm@rt Engineering to make sure that all customers benefit from the latest knowledge: Our employees have access to a central engineering information platform for their digital meetings, live streaming videos and online workshops. This is where experts from the whole Angst+Pfister group pool and increase their expertise and skills. Despite the pandemic, we are delivering even better solutions for our customers in a really agile and efficient way – and flying less often.

One or two of these developments are featured in this magazine. And hopefully it will not be too long before I can tell you about others when we finally get together face to face. I am looking forward to it.

Erich Schmid
Chief Technology Officer

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International**
Seals and bellows
for aerodynamics

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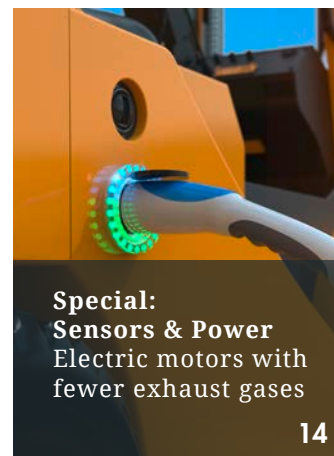
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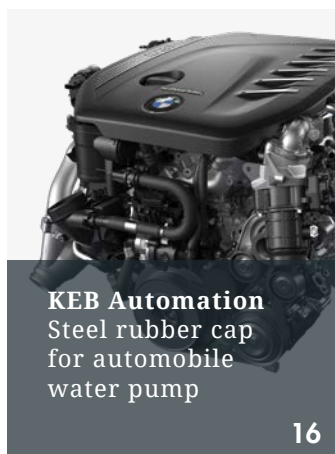
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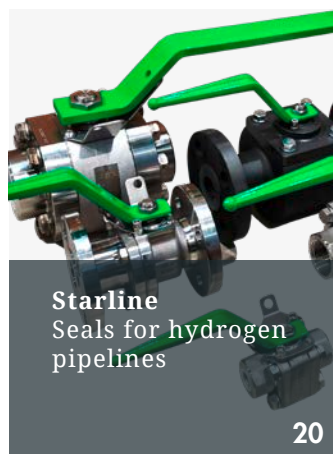
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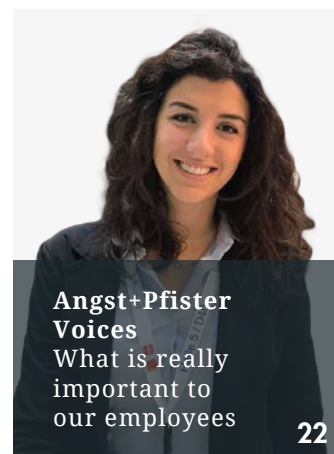
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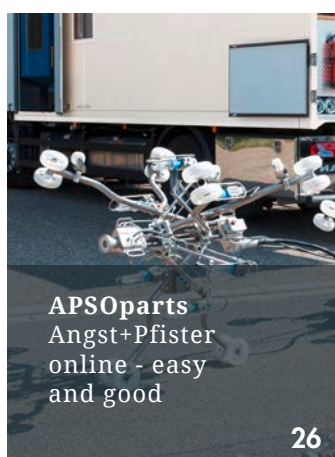
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Do you have any further questions about
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Active aerodynamics for a versatile and tough performance

When new components have to be developed fast, in top quality, for mass production, Angst+Pfister's engineers pull out all the prototyping stops – for example, with the seals for the active aerodynamics application made by Mirror Controls international. They were for installation in Ford's world-leading off-roader featuring cutting-edge technologies.

“Thanks to the close collaboration right at the start of the design process, we were able to develop high quality components at an attractive price. They formed the supporting cast for the successful introduction of a brand new active aerodynamic device from Tier One System Supplier Flex-N-Gate in the world's best-selling pickup truck,” says Marius Brand, Product Manager Active Aerodynamics at Mirror Controls international, a Flex Company. The company – abbreviated to MCI – is a supplier to the automobile industry and market leader in wing mirror control. It also produces camera monitor systems – and, of course, the controls for the active aerodynamic device. MCI delivers over 80 million appliances annually. With around 1,200 employees, MCI delivers to the major customers of the industry and is an important development partner.

The Angst+Pfister collaboration concerned a control element for the aerodynamics of the Ford F-150 – said by the maker to be “the most robust, innovative and versatile pickup truck ever” to leave the production line. To increase the aerodynamics, above a certain speed, air dam is extended from beneath the front bumper of the off-roader, and these are designed to optimally re-direct the air streams. The resulting decreased drag equates to improved fuel efficiency. In the past, this function was performed by a static element – a compromise between optimal wind resistance at higher speeds – and maximum clearance for slower off-road conditions. The new active aerodynamics device, with the air dam retracted, delivers maximum freedom in rough terrain – or lowers fuel consumption on smooth asphalt.

Three components for pioneering aerodynamics

MCI came to Angst+Pfister for the design, production and delivery of two radial shaft seals and a spring bellow unit for the small electric motor controlling the active aerodynamics. The seals are installed in the actuator unit of the system, whereas the spring bellow unit protects the spindle that moves the air dam (see drawing). “This was a very interesting project for us because we were able to demonstrate our strengths: inhouse design, Finite Element Analysis, rapid prototyping, samples, logistics on three continents and mass production volumes – and all this in exceptional quality,” says a pleased Jan Boomsma, Product Application Engineer in Sealing Technology at Angst+Pfister in the Netherlands.

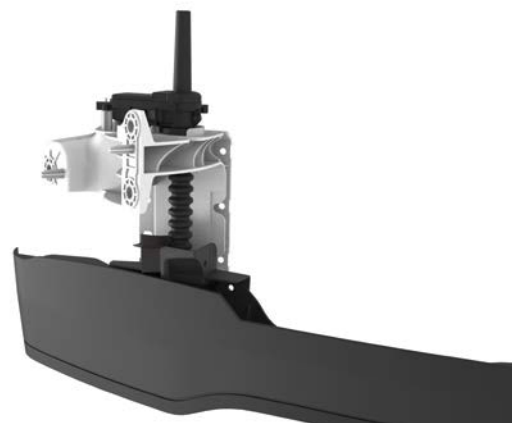
The Active aerodynamics systems have to last and be exceptionally reliable – even for big temperature differences from minus 40 to plus 85 degrees Celsius. The air dam stows and retracts around 300,000 times. The system must also be leakproof when in water. This requires protecting ratings IP67 and IP69K. In other words, it has to be completely dust-tight and even able to withstand high water pressure. The aerodynamics control device is produced in quantities of an annual 1.6 million. It also needs to comply with the PPAP (Production Part Approval Process) of the automobile industry. This is the acceptance procedure by which the parts made in serial production must be exactly as stipulated by the drawings. MCI requires 50 PPM quality – from one million produced parts, only fifty can be rejected. For Angst+Pfister's

seals, this effectively means that we must measure 100% of the parts during quality control with a fully automated sorting machine.

Innovative approaches for reasonable costs

“Of course, the price also played a role. Which made the design a bit of a challenge for us,” remembers Jan Boomsma. Angst+Pfister initially offered a pure rubber seal without metal reinforcement to keep the costs down; the initially designed seals have stainless steel reinforcement. But Jan Boomsma and his team sought an additional solution and integrated carbon steel reinforcement. “That was possible thanks to a specialist design in which rubber coated all the metal parts to prevent corrosion,” relates Jan Boomsma. In this way, Angst+Pfister fulfilled the requirements for high quality plus acceptable cost. As the customer, Marius Brand was impressed by this approach: “We now have an integrated solution with two functions in one component. The upper seal functions both to seal and pretension. In this way an additional part becomes superfluous.”

For the spring bellow unit, the engineers used an EPDM that holds up in low temperatures. The design had to even out the strong bending force from compression and expansion of the spring bellows for reliability to be guaranteed. At the same time, a certain roughness of the upper surface was called for to prevent it from sticking together when compressed.



«This was a very interesting project for us because we were able to demonstrate our strengths: inhouse design, Finite Element Analysis, rapid prototyping, samples, logistics on three continents and mass production volumes – and all this in exceptional quality.»

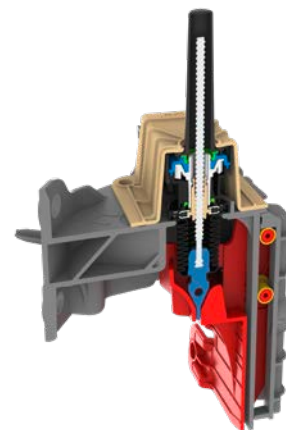
Jan Boomsma, Product Application Engineer Sealing Technology, Angst+Pfister Netherlands

Fast prototyping

The prototypes had to be available very quickly. “Normally, you need about ten weeks, we delivered in four,” relates Enrico Koggel, Product Application Engineer at Angst+Pfister in the Netherlands. The fact that all the designs were inhouse designs was particularly advantageous for the Angst+Pfister engineers. After the first tests, the design was refined again to improve its temperature durability. Then the tools for the prototypes could be made right away using the inhouse production platform. MCI put them through stringent testing for durability and installation. Following further optimisation, work on the production mould for the PPAP could be started. As soon as this had been approved, there was nothing stopping serial production from going ahead.

Enrico Koggel adds: “Angst+Pfister has several production platforms across several continents so that when things get tricky, other production facilities can be brought in to help out. Notwithstanding the Covid-19 crisis, this was luckily unnecessary.”

Marius Brand of MCI also adds his praise: “The prototype timeline was challenging, but we are very happy with both the quality of the work and the products. They fulfill all the requirements and successfully passed the full range of validation tests.” MCI greatly appreciated Angst+Pfister’s onsite technical support in the Netherlands. This includes, in the various phases of the project, the capability to conduct calculations and simulations with the prototypes, to respond to tests and to adapt the designs correctly, says Marius Brand.



The seals (green) are inside the actuator housing (beige). The spring bellows (black) protects the spindle (white). This moves the air flaps (red).

Grab an apple – or how intelligent fruit storage made fresh, tasty fruit a non-seasonal experience

Controlled atmosphere (CA) applications – the main theme of the Angst+Pfister Sensors and Power booth at this year's AICHEMA show – are used to control and maximize the performance of thousands of organic and inorganic processes in the industry, leading to products with a higher quality and value for the customers.





«Enter with me the fascinating world of controlled atmosphere applications – two applications out of thousands. Every single application requiring expertise in design-in and the ability to level with the customers.»

Dr. Thomas Clausen, Product Manager Gas Sensors, Angst+Pfister Sensors and Power

For instance, by controlling the oxygen content in various packaged food products, the shelf-lifetime can be extended, thereby reducing food waste. Fresh fruit, all year round, has long been a fact of everyday life, but what are tricks that are used to make fresh, tasty fruit a non-seasonal experience?

One trick of many is the application of long-life, stable gas sensors to control the atmosphere in a large storage box filled with premature harvested fruit and to be able to time the ripening process of the fruit. This article describes gas sensor solutions for fruit storage and ripening – a worldwide business that grows, and where our expertise is the key to success.

Gases that make fresh fruit out of the storage facilities possible

In my home country, Denmark, bananas were long considered a luxury good and therefore taxed accordingly high. Likewise for cars, chocolate and other things that make every day another good day. Stories about green snakes and poisonous spiders hiding in the banana baskets during the long overseas journey were invented to keep us kids from stealing the bananas. Bananas and fruit in general are now no longer considered a luxury good, but a way to a more healthy life/lifestyle by eating more fruits. My one apple a day, certainly have kept the doctor(s) away. This is, in effect, a story about how I got rid of my last childhood traumas

(snakes, spiders, worms, beetles and bugs) by being able to eat fresh fruit every day - fresh out of a storage facility.

The storage facilities for early harvested fruit and vegetables have normally multiple storage boxes in sizes up to container size and with volumes of up to 30 m³ for each box. Some boxes are virtually air tight to be able to lower the oxygen level in the box to a very low level, while other boxes are easily accessible from a port opening and thus not or only partially gas tight. The gas management system is normally installed in the service area and gas from the storage box is pumped through the gas sensors in order to be able to control and monitor the storage process and to be able to react upon unwanted changes in the environment in the storage box during storage.

Gases of main interest for the manufacturers of fruit and vegetable controlled ripening storage facilities are oxygen, humidity, carbon dioxide and ethylene. The strategies of storage are very different from fruit to fruit type, but also within the different fruit types (apples, pears,...) the strategies can be very different. I will limit myself to two cases, which I will describe in some detail and I will show what Angst+Pfister Sensors and Power can offer with respect to products and expertise. First a short description of each gas and how they impact fruit and vegetable ripening:

Oxygen - O₂ – we live and breathe oxygen. Take away the oxygen and virtually any living organism will have a problem. So by reducing oxygen in a storage facility, the problem of parasites is effectively eliminated ! Reduce oxygen and you will slow down the metabolism – this is the trick to store fruit for more than 9-12 months and to make just-in-time delivery of fresh fruit possible.

Carbon dioxide - CO₂ – normally a gas with a very bad reputation, but for the food industry, CO₂ is a central gas for food conservation. In a storage facility, CO₂ is either used to slow down the ripening speed or it is used to reduce the oxygen concentration in air in a storage box, where the oxygen concentration is otherwise not controlled.

Ethylene - C₂H₄ – is the exhaust product of ripening. Ethylene is also used to speed up ripening or it is monitored in order to be able to prevent unwanted ripening from happening. One rotten apple exhausting ethylene, can make the complete batch unsellable. This makes ethylene scrubbers popular.

Moisture – or water content in air is also a gas – fruit contain a lot water and by logic, fruit would dry out if stored under too low humidity conditions. Therefore, most fruits are stored in a high humidity environment in order for the water in the fruit not to evaporate.

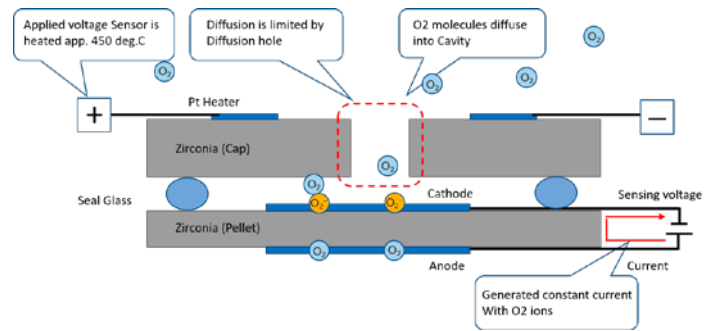


Figure 1. FCX-U finished sensor (left), FCX-U sensor opened; note the white, ceramic element on top of the white ceramic wool (middle), sensor principle (right)

Oxygen sensors from Angst+Pfister Sensors and Power

Juicy, sweet tasting or sometimes sour apples are a delicacy in the early autumn months and until start/middle of the winter season. Modern storage techniques have extended the delicacy period beyond even 12 months. This is how.

Most apple types are being harvested in a premature state in the first few weeks of autumn. They are then stored in so-called ULO (ultra-low oxygen) gas tight storage boxes, adding humidity of up to 95% and CO₂ gas up to 2.5%, while lowering the temperature below 4°C. The apples are put to sleep. When the apples are needed, they are slowly being cultured, primed and made ready for sales. The ULO principle for storage of fruit is not limited to apples alone – pears, kiwis, blueberries, mangos, grapes and cherry berries can also be stored under ULO conditions and be delivered as fresh fruit all year long. As also onions, garlic, cabbage and asparagus.

In order to measure stable, low concentration values of oxygen, a highly reliable oxygen sensor is needed. We have such a sensor in our program – the FCX-U (see photo) amperometric oxygen sensor from Fujikura Ltd. Fujikura Ltd is our most important partner – not only for oxygen sensors, but also for

pressure sensors. Fujikura makes ~ 600,000 pcs oxygen sensors per year – all handmade and highly competitive in price. ~ 95% of all of these oxygen sensors are sold to the medical industry for mobile respiration equipment. The rest we take - almost.

The FCX-U is a ceramic type of sensor with a very long lifetime – ideal for many applications, and in particular when it comes to controlled atmosphere applications. The sensor needs a predefined, very precise heater voltage, so that the temperature of the sensing element can be kept constant at 450°C (Figure 1). At 450°C, and when a potential is put between the sensor element anode and the cathode, a current is flowing through the element (Figure 1). The current is proportional to the oxygen concentration. This is the ideal world - low oxygen concentration equals low current and so forth. In reality, the sensor has certain cross influences from both CO₂ and humidity. The cross influence behavior is very much dependent on the potential across the sensor element. When the potential is too high, the water and the carbon dioxide molecules break and more oxygen is generated ($2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$) – leading to a systematic failure. When the potential is too low, the sensor stops working after only a couple of years in service, although a minimum of 4 years is guaranteed.

We manufacture customized oxygen sensor modules based on the FCX-U sensor. The most popular module, shown in Figure 2 below, is the FCX-MC25-FLOW-A-CH module, which is specifically developed for controlled atmosphere applications, taking into account varying conditions, such as CO₂ (up 50%) and humidity (up to 100%). The potential is chosen to minimize impact of molecules breaking up and still maintaining a long operational lifetime. The modules are produced in Switzerland and we have a capacity of more than 10,000 modules per year. The module is highly popular among manufacturers of fruit and storage facilities, but is also sold for many other controlled atmosphere applications such as anaerobic bioreactors, additive manufacturing systems and nitrogen/oxygen generators.

Figure 2. FCX-MC25-FLOW-A-CH OEM oxygen sensor module developed for in-line controlled atmosphere applications



Ethylene gas sensors from Angst+Pfister Sensors and Power

Banana ripening rooms are almost a scientific discipline of its own. Terms like “chilling the banana” or “cooking the banana” have nothing to do with gas or gas sensing, but is a consequence of temperature variations below and above an optimal storage temperature – therefore focus is maintaining the temperature constant and optimal during the ripening process. Humidity is a must – otherwise the bananas dry out. What makes bananas special from a point of view of gas sensing, is the controlled speeding up of the ripening process in special ripening storage facilities.

The most advanced fast ripening storage rooms for bananas are pressurized and the air is circulated/recirculated to maintain the best conditions during the fast ripening process. Some studies indicate an advance of lowering the oxygen in the storage room, but for the acceleration of the process another gas comes into play – namely Ethylene. Ethylene is actively used for the ripening process and the higher the ethylene concentration the faster the ripening. Most manufacturers recommend constant levels of ethylene of 100-300 ppm, but it probably comes as no surprise, when I mention that most owners of fast banana ripening facilities run at levels of 400-500 ppm. Ethylene gas is not easy to detect and here is why.

Ethylene has an optical footprint, which means that it absorbs infrared (IR) energy at a certain wavelength. The absorption amplitude is proportional to the ethylene concentration. It is relatively simple in theory

to build a sensor based on the IR absorption principle, but in reality, since it is a relatively weak absorption, the sensor output is subject to a lot of potential variations. Nevertheless, infrared absorption based ethylene sensors are being used for measuring and controlling the banana ripening process, because they offer a good compromise between price and performance.

Anything that interacts with radiation (and thus also IR energy) is excited into an intermediate, unstable state and relaxation into the ground state follows pretty quickly. The same goes for ethylene being irradiated with IR light at a certain wavelength. During the relaxation process, energy is desorbed from the ethylene atoms and this energy has an audible footprint. The amplitude of the audible signal is proportional to the ethylene concentration. A microphone is used to pick up the amplitude of the audible signal and this is the fundamental principle in a photoacoustic (PA) ethylene gas sensor, which has indeed a better performance in comparison to an absorption based ethylene, but is also more expensive. In some cases, also for banana ripening, the extra money is well spent, because the output of a PA ethylene sensor is more stable and reliable in comparison with an IR ethylene sensor.

In the presence of enough potential energy and oxygen, it is possible to break the ethylene atom. If the process is done on electrodes in contact with an electrolyte, a current can be generated in an external circuit, and the generated current is proportional to the ethylene concentration. It is a very simple and well-known technique and the so-called electrochemical (EC) sensors make up most

of the gas sensor market. Ideal, one would think as a basis for a good, cheap sensor for banana ripening. The downside of something so cheap is cross influence from a lot of other gases such as ethanol, carbon monoxide, nitrogen dioxide and other gases that are probably also present during a ripening process. One truck loading bananas, while still emitting exhaust gas (motor running) and the ethylene sensors go bananas. The use of electrochemical ethylene sensors are limited, but it is possible to make it less cross sensitive to other gases. But, the design is complicated and the yield is low.

Our main business is on the IR type of sensors, where we have a corporation with a renowned supplier for these sensors. In Figure 3 below is shown a 0-2,000 ppm ethylene IR sensor, together with a rough sketch of the detection principle, which is perfect for controlling the banana ripening process. The sensor has a long absorption hollow tube made in aluminum and polished to a state in which the reflection from the polished surfaces are close to 100%. The IR light travels from end of the tube, where it is emitted from an IR source, to the other end of the tube, where the remaining light (i.e. the light that has not been absorbed) is detected. Gas input and output is via flow adapters mounted on the outside of the sensor. The detector is not just one detector, but in fact two detectors are used to control the IR light. One detector measures the light that has not been absorbed by ethylene in the long tube and the other sensor measures the intensity of the IR source, independent of the absorption from ethylene gas.

IR-radiation source



Reference Channel

Measurement Channel

Dual-detector

Ref.

Meas.

Interference filters

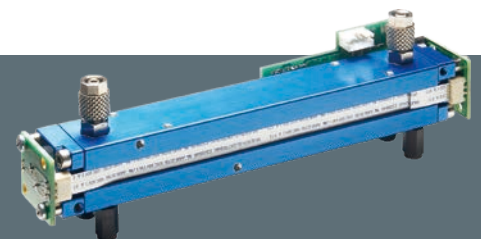


Figure 3. F3 NDIR ethylene 0-2,000 gas sensor module developed for in-line controlled atmosphere applications



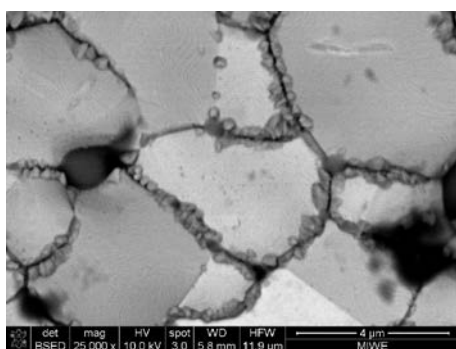
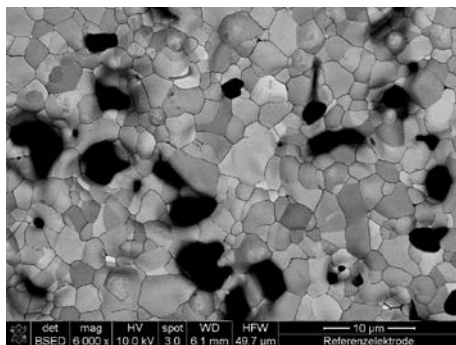


Figure 4. SEM pictures of the surfaces of a) perfectly working sensor and 2) a failed sensor. Note the difference in magnification. Essential for a perfect working sensor is that the grain boundaries are perfect and clean. In the picture to the right (large magnification) it is clearly demonstrated that the grain boundaries are filled with pollutants. A X-ray analysis revealed that the pollutants was mainly copper.

Closing remarks and business outlook

The climate debate is part of our every day life and most of us agree that something is maybe moving in the wrong direction. Over the last two years, we have received more oxygen sensors back from our customers that have suffered from a premature breakdown and failure. We try to offer our customers the best service by making an analysis of what could have caused the unexpected breakdown. Mostly, it has been the FCX-UC sensors that have suddenly stopped working and this is suspicious. Suspicious, because the sensor lifetime is normally very long and the signal output very stable over the lifetime of the sensor. After having received > 10 sensor modules back over a period of 6 months, we decided to open the sensor and look for possible root causes on the sensor elements. It turned out that a combination of dry weather (from climatic changes), combined with a fixed procedure of how to get the apples ready for harvesting caused the problems.

Just before harvesting the apples, the apples are sprayed with a copper sulfate solution in order to eliminate problems with mildew and apple scab. Because of the dry weather, the solution was not naturally washed away from the surface of the apples and the apples were taken to the storage rooms, where a significant amount of the solution was still on the surface of the apples. In a storage facility, the humidity is high, which caused the solution to be dissolved in the air with

the humidity. The air, now having high concentrations of humidity and copper sulfates, is being flown through the oxygen sensors and if there is one thing a FCX-UC sensor does not like, it is the combination of humidity, copper and sulfur.

When we opened the sensor and looked with very large magnifying glasses in an electron microscope facility, we found traces of copper in the oxygen sensing grain boundaries on the surface of the sensor element (see figure 4). Our customer was simply unlucky with the weather and was responsible for his own "mishap", so to speak.

The business outlook for gas sensing solutions for long-time storage of not only fruit and vegetables, but also other types of food, chemical and medical products, is good and the business is growing. Most of the business worldwide is supported and dominated by specialized domestic companies working with domestic customers. Whatever works in Korea, is not necessarily working well in Denmark. Our job is to select the right gas sensing solution for a certain product based on experience, expertise and the ability to discuss requirements with the customer – be it the specified, hard and written down requirements or the non-specified, subtle and soft requirements that can win us the deal.

Understanding each other over the miles – communication is the thing

Building trust with new customers, overcoming cultural and language difficulties, explaining technically complex matters – at the point where crucial details are decided – is no easy matter when communication is digital. Knowing the success of their consultation approach, Angst+Pfister's engineers were able to take on difficult projects right in the middle of the pandemic – projects whereby failure was not an option – such as the three new antivibration components for the South Korean company Dawonsys.

Dawonsys is a diversified South Korean technology business that manufactures rolling stock for the railway industry. One of its bogies is used by the South Korean state railroad Korail for a multiple unit with which it operates high-speed services. "You will never fail with Dawonsys," is the motto on their flag – a sentiment that also boosted the motivation of Angst+Pfister's engineers.

"We felt quite sure that we would impress our new customers in South Korea with our technical expertise," recalls Arno Vinzens, Sales Project Manager for Antivibration Technology at Angst+Pfister's headquarters at Zurich. The challenge was more in coming to terms with the geographical distance necessitated by the pandemic with only digital communication to see us through. At the same time, there were cultural and language differences. And then, there was the organisation of complex logistics between the international production plants of Angst+Pfister, a new South Korean sales partner and the final customer, so that, for example, the free trade agreement could come into effect.

Overcoming cultural differences digitally

Initially, the Sealstar company in South Korea coordinated the interface between Dawonsys and Angst+Pfister. The Angst+Pfister Group Engineering in Switzerland took on the project. Navigating the work culture was a steep

learning curve. Michael Forrer, Senior Engineer, looks back on a successful project: "We are used to moving step-by-step to an ideal solution during a project. At the start, you usually work with approximations. The resulting information is then applied to implement small changes or even completely change the course of the project."

In this project, all the defined initial values, even before the prototype phase, were considered sacrosanct as soon as they were released for the supply chain to the end customer. This involved extremely detailed consideration of: What is going to be tested? How is it going to be tested? To do this Angst+Pfister was required to submit binding proposals. "Right from the start communication had to be careful and exceptionally precise." Changes were virtually impossible during the project. "Even those people familiar with Asia needed to learn to adapt to certain national characteristics for the projects to be concluded successfully," adds Arno Vinzens. This also necessitated Angst+Pfister finding creative solutions – such as minute component design adaptations so that testing could be carried out constructively and exactly as defined at the start of the project. The high degree of commitment and expertise Dawonsys brought to the project was a massive contributing factor to its success. Cross-cultural cooperation worked from start to finish – made possible by the high level of competence on both sides.

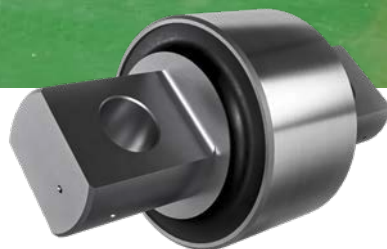
Transparency and experience generates trust

Three different rubber-metal components were requested. Transverse bumpers in the bogie absorb the lateral centrifugal forces of the coach body by providing cushioning for the immersion spindles. The bumpers require progressive stiffness to achieve this, so that as pressure increases, resistance likewise increases. An axle-guide bearing isolates the bogie from the vibrations caused by the unevenness of rail tracks. Spherical bearings reduce the vibrations between the coach body and bogie that are generated by the braking forces. "The three bespoke components are fundamental to the functioning of the new bogie," Michael Forrer is pleased to note. We were also able to contribute our experience of endurance tests, approval compliancy and certification requirements.

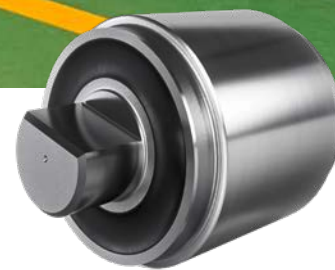
The project was in two parts, whereby Angst+Pfister was initially awarded only the first production volume. During the project, the South Koreans decided to extend the contract with Angst+Pfister. "Our openness and transparent communication was without doubt a help," says Michael Forrer. In the meantime, several thousand components have been delivered from the Turkish Angst+Pfister production plant to South Korea.



The traverse buffer absorbs lateral forces during cornering.



The spherical bearing reduces vibrations during starting and braking.



The axle-guide bearing prevents vibrations caused by uneven rails.



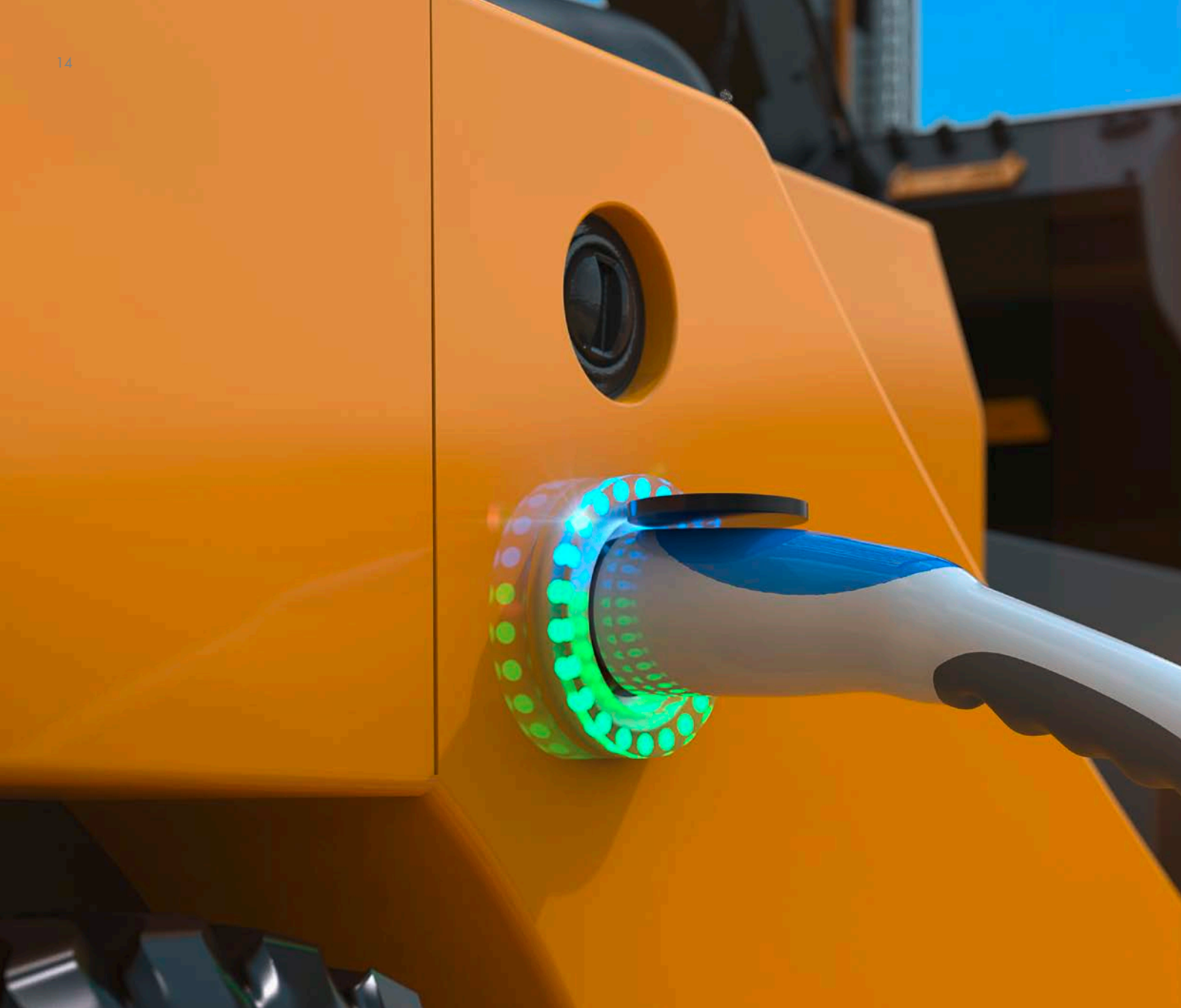
«Right from the start communication had to be careful and exceptionally precise.»

Arno Vinzens, Sales Project Manager Antivibration Technology, Angst+Pfister Group



«The three bespoke components are fundamental to the functioning of the new bogie.»

Michael Forrer, Senior Engineer Antivibration Technology, Angst+Pfister Group



Construction equipment is loud and dirty. Higher and higher limits are being set on exhaust and noise emissions in inner cities and environmental zones. The same is true for agricultural equipment, although its direct impact on the surrounding environment is not as acute. Where diesel engines are still pattering around today, electric motors will soon be responsible for driving, steering, and lifting loads.

Power levels should reach those of diesel equivalents, with the energy coming from sufficiently large batteries. Construction sites set up for this will house a power supply for temporary systems like electric diggers and mixers, alongside fixed equipment like electrically operated building cranes. The reason is obvious. Every piece of equipment

should be able to work for the whole eight-hour workday without generating noise or emissions.

Thanks to the automotive industry's timeline for phasing out fossil fuels and the highly advanced electric drives and charging systems the industry has developed as a result, fully or partially electric operations are becoming more and more significant in industrial applications. The huge teams in the R&D departments of car companies are what allow them to make such leaps. Small and medium-sized enterprises, on the other hand, face major challenges. Using a standard product would mean having a solution to hand faster, but also giving up some control over the specifications.



Fluid-cooled modular inverter platform

Exhaust reduction with e-motors

Making life easier for R&D departments and fast-tracking implementation with a modular inverter design



Angst+Pfister has teamed up with Mankel Engineering to design a new inverter concept based on passive sub-module components for small and medium-sized enterprises. The MOD.INV helps good ideas grow and gives customers the flexibility they need while allowing them to retain control over their own R&D as their “core expertise”.

Save time and money, for example with a kit made of effective standard power electronics components like scalable semiconductor modules from market leaders. Not

to mention the solutions already included and a production depth that can be adjusted as needed. The new platform, already successfully used to test electric motors from German automobile manufacturers, also supports smaller projects whose production run would make them uneconomical.

Developing a highly compact inverter for powers ranging from 75 kW to 150 kW for the industrial standard of 500 volts becomes a much faster affair. The newly designed driver board uses the latest IC techno-

logy to enable activation and control of both Si IGBTs and the new wide bandgap products like silicon carbide (SiC FET). An adapted software GUI (graphical user interface) is offered along with the electronic hardware, for example as an interface for operation and parametrization.

Please contact us for more information about this modular inverter development environment.



«The new platform, already successfully used to test electric motors from German automobile manufacturers, also supports smaller projects whose production run would make them uneconomical.»

Harald Thomas, Product Manager, Angst+Pfister Sensors and Power

Out of the ordinary caps for challenging requirements

When a design is difficult, there are time constraints, and the solutions have to be economically viable – that is when Angst+Pfister's engineers are in their element. Applying unconventional thinking in the design process, the sealing experts succeed to “square the circle” – as they did for a new cap that KEB Automation produces in millions for the car industry.





«The ever increasing customer requirements in this project were certainly a big challenge. In addition, our core expertise is in electromagnetic components and not necessarily sealing caps or end caps. Always ready to adapt to new conditions, Angst+Pfister was a very valuable and reliable partner.»

Hartmut Brünger, R&D Automotive, KEB Automation



«It was important to be thoroughly involved in the complex discussions, be persuasive with technical knowledge, to be on site regularly and think in terms of solutions.»

Jan-Ole Rienhoff, Product Application Engineer Sealing Technology, Angst+Pfister Germany

KEB Automation is a medium-sized company operating across the world with over 1,400 employees. It owes its customer success to exemplary virtues such as hard work, ambition and reliability – and a dedication that is “Made in Germany”. This laid the foundation for the continuous growth of the company, which has been supplying its customers with drive technology for over fifty years - from control systems to engines to specialist brakes and connectors.

One of KEB’s customers, an automotive supplier, was looking for an electromagnetic connector to control a water pump – which was going to be built directly into the pump. The water pump, in turn, was going to be integrated into the diesel engine of a leading German car manufacturer. The connector, therefore, had to have a cap affording protection from various substances in the engine compartment - for example, oils, hot steam, dirt and water.

High pressure – good communication

“Our customary technical problem-solving expertise was doubly tested on this project,” remembers Jan-Ole Rienhoff, Product Application Engineer in Sealing Technology at Angst+Pfister. “After a lengthy design process, all of a sudden there was the imminent production start-up for millions of parts – and the car manufacturer’s deadlines coming thick and fast.” At the same time,

additional challenges were encountered along the supply chain. The component was modified rapidly in a highly iterative process. “It was important to be thoroughly involved in the complex discussions, be persuasive with technical knowledge, to be on site regularly and think in terms of solutions,” says Jan-Ole Rienhoff. “Customer contact and communication are incredibly important in projects like these.”

There were aspects to be considered such as: What sort of geometry would be suitable for the confined space. Given the cap need to be designed around the existing components. And: How can we make sure that the cap stays firmly in place? Limited space meant minimal supporting surface. Simultaneously, it was important to keep the insertion force to a minimum. And last but not least: Which design would also make most sense from a business perspective? “Standard solutions were not going to go far with this,” Jan-Ole Rienhoff realised straight away. They had become accustomed to looking for the best compromises. At the end of the day, the component also needed a highly specialised assembly vulcanisation tool.

Finding unconventional solutions

In the end, the cap centre was made from an enclosed stiffening plate of stainless steel over-moulded with a sealing rubber. “Rubber on its own would have been insufficient.

It had to be combined with a non-corrosive metal for extra strength,” explains Jan-Ole Rienhoff. The first prototype was based on an open stiffening plate with a rubber membrane. The rotation force meant that it inflated and came too close to other components. In addition, at the end, the solution for the cap was a “non-tight seal”. Three grooves in the outer rubber corrugation serve as vents to prevent a vacuum. Otherwise the cap could pop out. Grooves in the rubber make the cap easier to mount. The team went for an acrylic rubber (ACM). “In this engine space, the material was a cost effective alternative to high-grade FKM,” continues Jan-Ole Rienhoff. Tests concluded that the elastomer material does function effectively.



For this sealing cap, a stiffening plate is over-moulded with rubber.

Rapidly accelerated electrification and rising demands

Affordable, highly efficient power conversion with SiC technology

For electrical grids to work reliably and efficiently, international standards have been defined to limit the feedback effects a large number of electronic applications have on the grid. Power factor correction (PFC) is a very efficient and effective approach to reducing these kinds of harmonics. PFC ultimately regulates the AC input current so that the efficiency of the actual power coming from the grid is maximized.

One highly efficient form is bridgeless totem-pole PFC (TPPFC). TPPFC improves on conventional PFC even more by reducing the number of semiconductor components, leading to greater efficiency (over 99%) and a higher power density. This kind of set-up also complies with current EMC guidelines. UnitedSiCTM is now offering a new generation of silicon carbide (SiC) products that also enable the all-important continuous operation (CCM) of the totem-pole PFC stage and make it a simple, efficient, and affordable solution.

The Angst+Pfister “BeFAST” (image 1) is the world’s first test platform for determining the key parameters of these new SiC products. This board can handle complex searches for suitable components needed for operation. The layout has been designed to avoid distorting the product characteristics being analyzed.

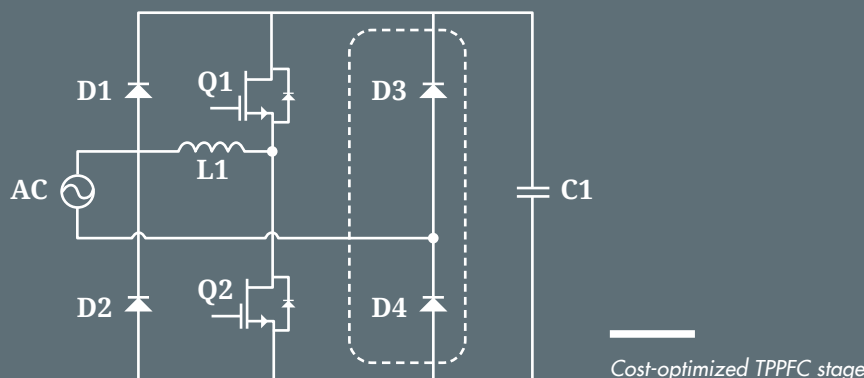
BeFAST enables rapid, cost-effective analysis of SiC technology, avoiding the laborious process of adapting components and changing layouts.

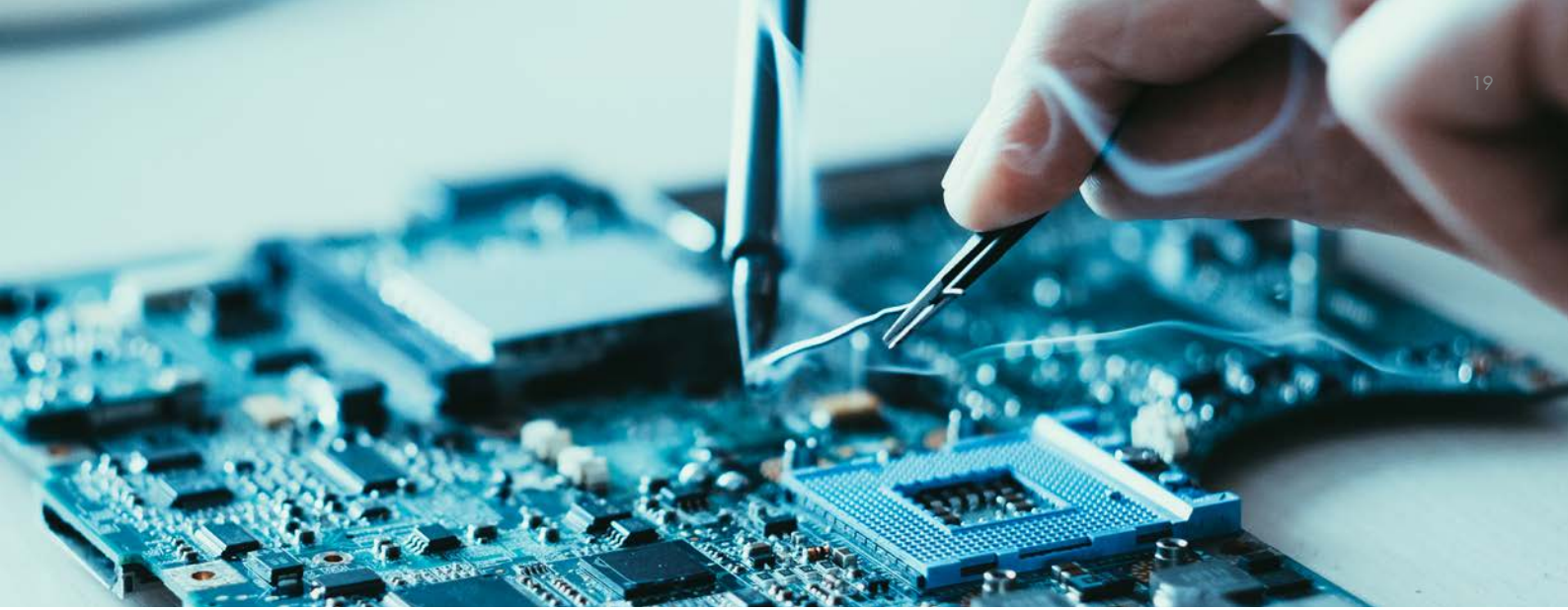
SiC technology is used as a circuit breaker in PFC because it offers significantly better product characteristics than conventional technology. Efficiency is also improved by better values of ON resistance $R_{DS(on)}$ and less charge (Q_{RR}) accumulating in the integrated diode and causing losses. Overly high values of these two product characteristics previously hindered efficient operation (CCM). Another advantage of SiC technology is its

higher switching frequency. This means that all associated components can get smaller as the frequency increases.

Using this new SiC generation in TPPFC stages has an even greater impact where space or cost need to be optimized. For a peak efficiency over 99% and a load over 50%, the two SiC switches in the “slow leg” could also be replaced by affordable silicon superjunction switches. In this case, it would also be very easy to replace these switches with standard silicon diodes, plus two others placed parallel to the two remaining SiC switches (image 2).

These two types of PFC stages are already being used in many areas, such as AC/DC converters and grid components for continuous loads like telecommunications and computing centers.



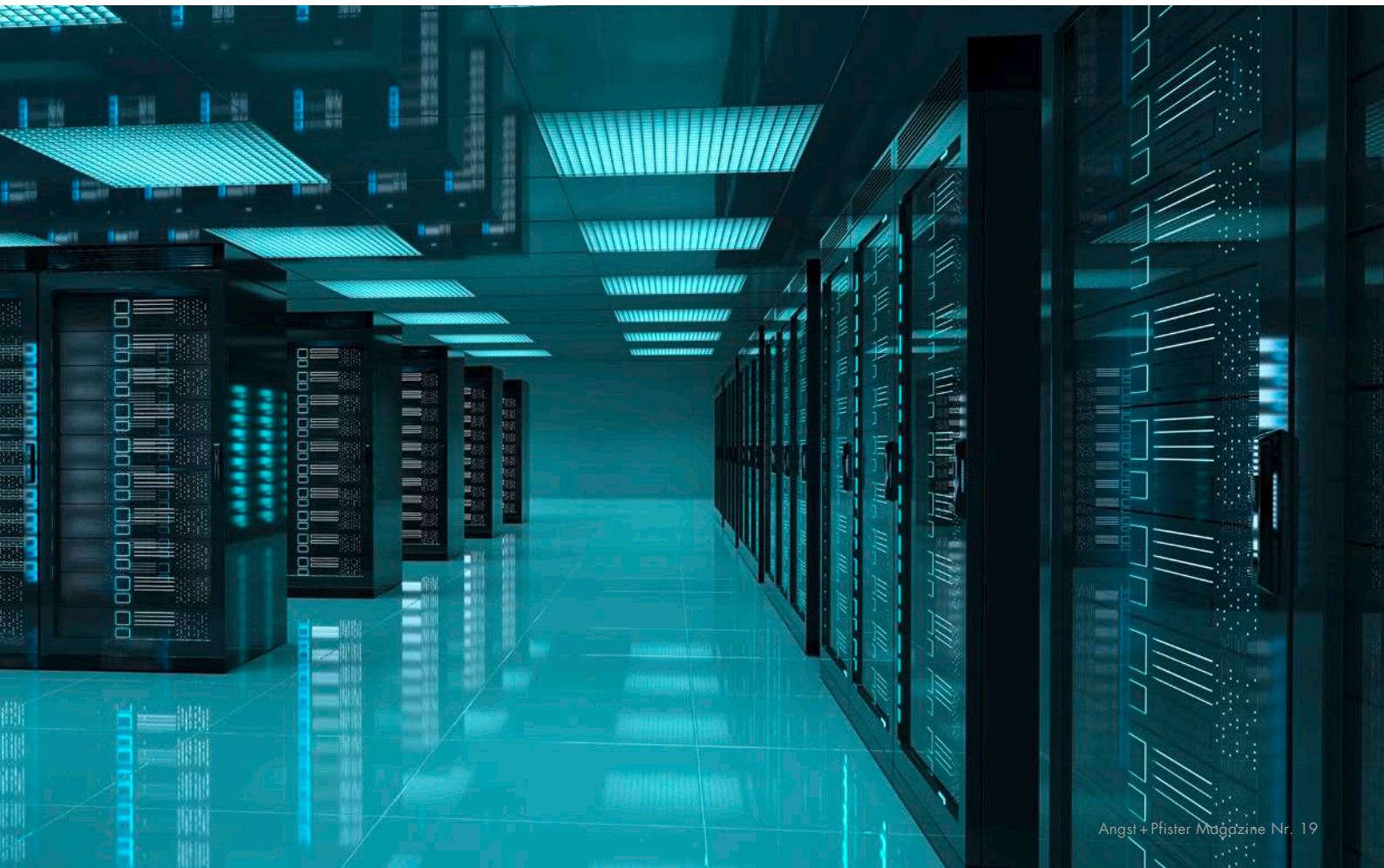


«BeFAST enables rapid, cost-effective analysis of SiC technology, avoiding the laborious process of adapting components and changing layouts.»



Harald Thomas, Product Manager,
Angst+Pfister Sensors and Power

AP-EVAL-UJ4C075018K4S (BeFAST)



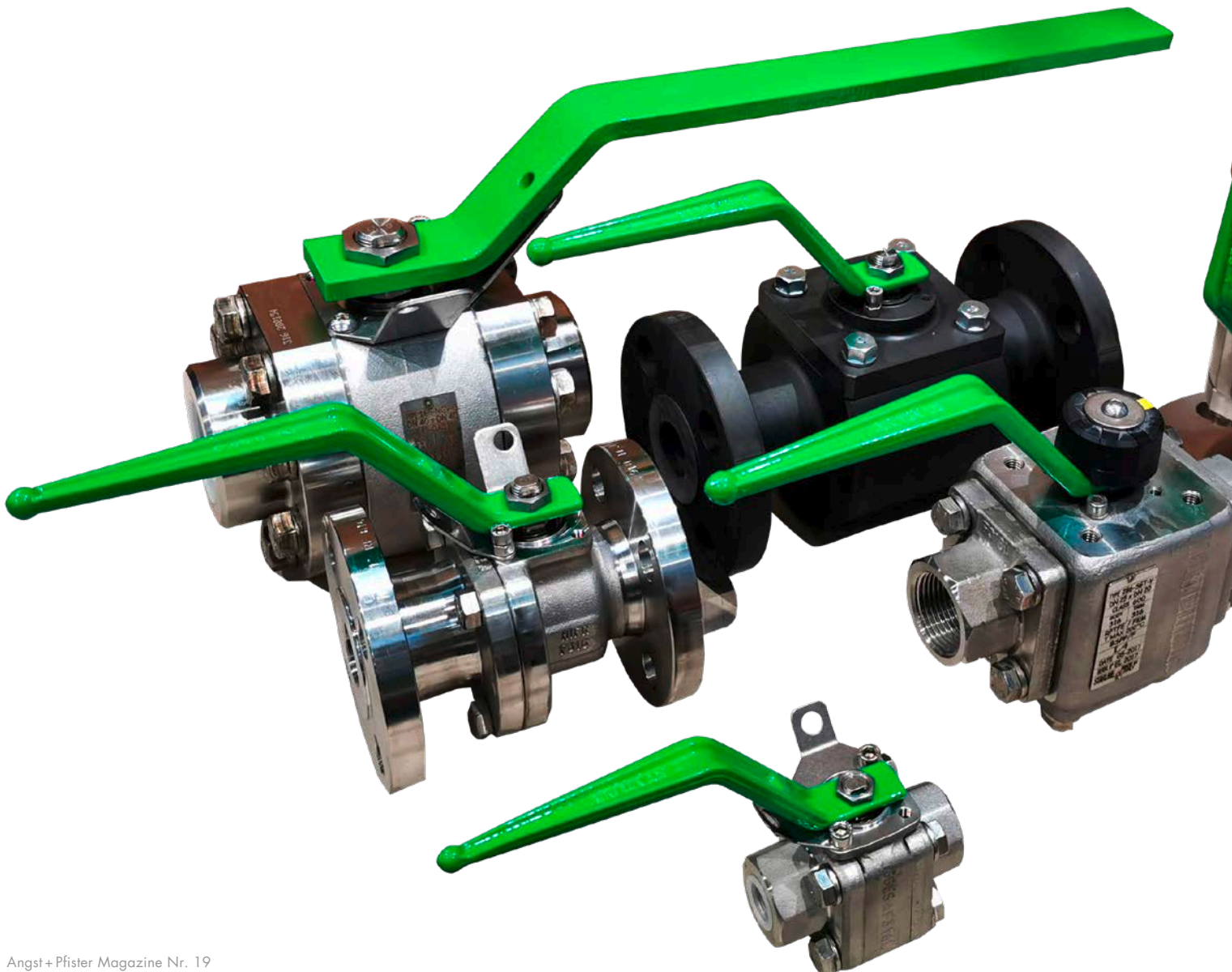
Hydrogen seals for the energy transition

Although demand for energy is increasing, CO₂ emissions have to be curbed. Climate-neutral hydrogen could help replace fossil fuels – and industry is investing heavily in the technology. Repurposing existing pipeline infrastructures for hydrogen requires seals that can retain the smallest of molecules. MCM S.p.A is working on providing factual data on such seals.



«We are currently working on identifying the best materials but do not want to rely purely on theory and literature.»

Raffaella Villa, Business Development Engineer, MCM S.p.A, Italy



Environment and climate protection policies are pushing for ever more decarbonisation. Hydrogen is a highly promising source of energy for the future. Its calorific value is greater than oil or natural gas and it combusts with neutral impact on the climate – that is, without releasing CO₂. Hydrogen is known as “green” hydrogen when it is produced from renewable sources. Costs are going down but are still relatively high – for the time being ... Nowadays, hydrogen is generally blended with methane or natural gas to reduce the CO₂ footprint.

The unstoppable advance of hydrogen

“Investment in hydrogen technology is massive right now,” remarks Raffaella Villa, Business Development Engineer at MCM S.p.A in Italy. The company is part of the Angst+Pfister Group and specialises in rubber seals for the automotive, aerospace and oil industries. Enquires about hydrogen

seals at MCM have increased dramatically since 2020. “We are expecting even more in the near future.” This is in part due to the fact that hydrogen can be transported along the existing global pipeline network. No new infrastructure is required. It’s a mere matter of repurposing.

“We are already working on hydrogen applications and, within this ambit, a very interesting and significant collaboration is the one with Starline SpA: it is about valves used for the production of green hydrogen, where service in 97% vol hydrogen is required.” Starline SpA, forged steel ball valves maker, is a hydrogen pipeline valve manufacturer. Those valves now require seals suitable for hydrogen. The valves will be supplied to companies such as Iberdrola – a Spanish energy giant among the European electricity producers and distributors. Iberdrola is investing untold billions in the production of green hydrogen.

What is the optimum seal material?

“Gas is a tricky one for elastomer seals, especially hydrogen,” says Raffaella Villa. There are completely different requirements to be met than for liquids – in addition, hydrogen is the smallest molecule of all. This gas can slowly diffuse through the molecular structure of polymers. That’s why the focus is on the permeability of elastomer compounds. Escaping hydrogen is a serious safety concern. High pressure in the pipelines makes hard elastomers the most likely choice. However, not all compounds behave in the same way with hydrogen.

“We are currently working on identifying the best materials but do not want to rely purely on theory and literature,” says Raffaella Villa. FKM and HNBR have already been floated as potential solutions for hydrogen, but MCM also wanted to investigate precisely which elastomer is most suitable for which function. “We want to produce a ranking system.” For this reason MCM is having its entire portfolio permeability tested by an external laboratory.

Reliable permeability data

Although hydrogen itself does not damage elastomers chemically, environmental conditions can be an issue. In general, this means: the higher the pressure or temperature the more permeable the seals become. Depending on the intended application, chemical resistance can also be a requirement. All these factors limit the choice of elastomer – and usually a compromise is sought. MCM aims to present its customers with reliable data on applications involving hydrogen.

The current project for Starline required exceptionally hard seals that can withstand pressure to 35 bar – but also modest temperatures from minus 10 to 65 degrees Celsius. “Starline could use one of the compounds in our portfolio to develop valves for its Iberdrola project, but we are now checking what our portfolio can further deliver. The portfolio is already enormous but we would nonetheless be prepared to develop new elastomer compounds for hydrogen seals,” explains Raffaella Villa. At the end of the day, they would also be of interest to other industries such as the automotive industry.

Experience and expertise for new applications

Reliable data and choice of material are one thing – MCM is also contributing its expertise in compression and injection molding of the parts. “The moulds for such materials are not a trivial matter,” adds Oliviero Mismetti, who is Project Manager at MCM. MCM’s experience is crucial for the required tolerances in manufacture. MCM’s knowledge is also in demand for AED (Anti-Explosive Decompression) approvals – that is, for decompression resistant seals. “It is exciting that, thanks to our capabilities, we are asked to produce pioneering work on new technologies that will force decarbonisation in Europe,” Raffaella Villa is delighted to report.



Angst+Pfister Voices



Michael Strand

Continuous Improvement Engineer, O.L. Seals

«I love all my new challenges in the sealing business and the cooperation with my skilled colleagues.»

Before joining O.L. Seals at Angst+Pfister, I worked as a PTA technician at CFT Gears. CFT is a small, low-volume gear manufacturing family company. My primary tasks were to support production by programming the CNC machines, machine-settings and production methods – in addition, I was involved in CAD construction, tool development, design and technical support for the customers. I was the link between sales, logistics, key account managers and production. Over the 8 years at CFT, I gained solid technical experience in manufacturing and gearboxes. I started at O.L. Seals in March 2020 as a continuous improvement engineer. As part of the technical team, it is my job to ensure that our production runs smoothly. I work daily with ISO and Quality aiming at achieving continuous improvement. I also provide our production departments with technical drawings, our customers with test drawings, and maintain our master data in the ERP system.

My many years of experience as a CNC and PTA technician have been in the metal industry, so the sealing industry, sealing design and soft Teflon materials are still quite new to me. But this new world fascinates me, and my learning curve is still steeply upward. I am highly motivated to solve technical problems and work with manufacturing processes. I love all my new challenges in the sealing business, and really enjoy working with my skilled colleagues – and always try to meet them with a smile and a calm mind. At O.L. Seals, no two days are the same.



Kubilay Sancakzade

Project Manager
Angst Pfister Advanced Technical Solutions A.S.

«Being in contact with customers, the broad network, team management and taking part in all processes are all important aspects of my work and why I like my job so much.»

Before I joined Angst+Pfister in 2009, I worked as a production engineer at Warmhaus International between 2008 and 2009. From 2014 to 2018, I held the position of project executive and since 2018 I have been working as project manager. In my current job I manage the project team responsible for automotive, railway and industrial projects. I work in line with the project management methodology designed to achieve successful project delivery. My responsibilities include developing the project scope and objectives to ensure technical feasibility, and to engage all the stakeholders in the project. I also handle overall quality management and planning coordination, coordinate project team activities within a given budget and schedule, and am responsible for coordinating supplier activities for the project phase and customer process. In addition, I define solutions based on the customer's stated requirements and am lead for technical-commercial answers to RFQs. Last, but not least, I deal with the system audits at the production site. Being a project manager gives me a wider perspective allowing me to take responsibility in all processes and work within a larger network. This is crucial to be able to foresee and forestall potential problems – and to launch projects confident that they will be 'first time right'. In summary : being in contact with customers, the broad network, team management and taking part in all processes are all important aspects of my work and why I like my job so much. I have been working at Angst+Pfister for 12 years now – my first long-term job. In those 12 years, Angst+Pfister and I have developed together, so Angst+Pfister feels like family to me.

Being part of the Angst+Pfister family is very valuable for me, because here we are all customer oriented, and we work in a wide range of markets all around the world. In this way, our network is extended, and a challenging environment is created within the company.



Simona Pantano

Sales and Customer Care, MCM

«I think Multiculturalism is an important concept to learn, to recognize, to manage and to integrate, not only at a human level but also at a business level in order to increase sales, to strengthen the brand image and the company reputation.»

In my position in sales and customer support, I work every day to maintain and consolidate our customer portfolio and strengthen customer loyalty, which, together with new business activities, contributes to the growth of the company. In addition to the management of orders and offers, the assistance I give to the customer concerns clarifications of different kinds, information, complaints and warranty on the products. I carry out support work in the search for new customers and marketing activities, especially for the organization of national and international fairs.

I like that my job is varied: every day I face new challenges. Moreover, from the beginning I have had the opportunity to relate daily with people from all over the world. Here I consider fundamental the concept of multiculturalism, that has always fascinated me and that has accompanied my studies. Every customer is different, every person is different and the

culture and the environment around us influence the relationships we establish: I think it is an important concept to learn, to recognize, to manage, to enhance and to integrate, not only at a human level but also at a business level in order to increase sales, to strengthen the brand image and the company reputation.

Joining an international group such as Angst+Pfister has certainly expanded our business opportunities and allows us to deal daily with a highly structured company. I very much appreciate the attention that the company gives to the individual employee, enhancing the work and developing the motivation making everyone feel part of a consolidated group, open to dialogue and to critical confrontation. Last year during the critical phase of Covid in Italy we all felt the Angst+Pfister family close! It was very much appreciated!



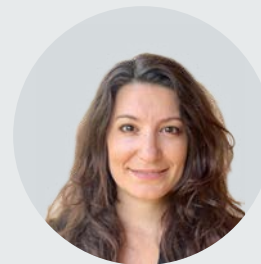
Enrico Koggel

Product Application Engineer Sealing Technology,
Angst+Pfister The Netherlands

«Try learning something new every day because you might be using it tomorrow.»

Before working for Angst+Pfister, Enrico was a mechanical engineering trainee (2013-2017) and worked his way up to become a technical sales engineer at Plasma Service where he could support customers in the field with technical solutions for worn or broken machine parts. At Angst+Pfister, Enrico joined Internal Sales, followed by a trainee program to become a product application engineer. In this role, he supports customers in the development of sealing solutions by leading the design, prototype and production phases while ensuring that all requirements are met throughout the project.

Known for his enthusiasm, Enrico enjoys putting his network and acquired knowledge to the test, which has resulted in the successful acquisition of large projects with clients from a variety of industries. He loves to work in challenging conditions – as evidenced by the number of projects he manages. Besides that, he is specialising in Rapid Prototyping, to shorten the design validation process. “It gives me great satisfaction to make use of all the capabilities we have, in convincing the customer to engage us at the early stages and then develop a great product with them. Doing so in a strong international team has been a dream for me.”



Mélanie Delonca

Head of Business Development Drive Technology,
Angst+Pfister Switzerland

«I have the opportunity to work with passionate people every day. Drive Technology is a family within a family.»

After 6 years as a PhD mechanical engineer in research at CERN, Mélanie joined Angst+Pfister in 2018 as a product application engineer in Drive Technology. In this role, her main tasks were to support and advise customers in finding the best technical solution for their applications. After one and a half years of working on exciting projects, Mélanie took over the responsibility of Head of Business Development in Drive Technology with the mandate of providing effective support to enable continuous growth of the department through production capability development and a global focus of the sales team throughout the world.

“I have the opportunity to work with passionate people every day. Drive Technology is a family within a family. We are given strong support from the Angst+Pfister Group in developing new product competencies to better serve the market. At the same time, we continuously support each other across the globe, benefiting from each other’s knowledge, meaning we can deliver considerable added value for our customers, leading to innovative yet cost-effective solutions. Today – together – there is no challenge we cannot tackle.”

100,000 Times Exactly the Right Product

It doesn't always have to be a specification. For developers and especially for buyers, it's worth taking a look at the extensive range of Angst+Pfister on www.angst-pfister.com - or a visit to the online shop www.apsoparts.com.

APSOseal® HITEC® O-ring



The Angst+Pfister HITEC® O-ring range includes O-rings with approvals for drinking water, food, pharmaceutical and medical technology in the materials NBR, EPDM, VMQ and FKM. The material EPDM 70.10-02 is particularly worthy of note, since this material, in addition to outstanding mechanical properties such as low compression set also has all the approvals in the aforementioned industries - and for a single material too.



APSOseal® FEP-O-SEAL® O-ring



The FEP-O-SEAL® O-ring is the optimal combination of two materials: The core of elastic silicone or FKM ensures the restoring force and the FEP sleeve guarantees the chemical resistance. FEP-O-SEAL® O-rings are ideal for use in the food, pharmaceutical and medical industries: They can be deployed in a variety of applications at temperatures ranging from -60°C to +200°C. In addition, they are pressure-resistant and guarantee low compression set coupled with much lower tendency towards cold flow compared to PTFE. They also have FDA and EG1935/2004 compliance, as well as 3A Sanitary Standard and USP Class VI.



APSOseal® Kalrez® perfluoroelastomers (FFKM) O-ring



Kalrez® O-rings possess unique operational properties that are unmatched by any other elastomer material. Kalrez® synthetic rubber in its various compounds combines the elasticity and sealing power of a genuine elastomer with the chemical resistance of PTFE. Kalrez® O-rings are resistant against practically all chemicals and can be deployed in continuous operation at temperatures up to +327°C or for brief periods at temperatures up to +350°C. Kalrez® O-rings compliant with FDA or USP VI requirements are also available. Angst+Pfister stocks a huge assortment of Kalrez® O-rings and has direct access to special-sized Kalrez® O-rings. Where conventional materials fail, Kalrez® perfluoroelastomers (FFKM) provide the least expensive and most reliable long-term solution from a total cost standpoint.



APSOvib® conical bearings

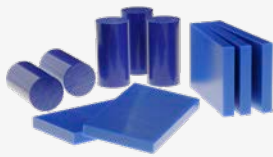


APSOvib® conical bearings are designed for use in agricultural and construction machinery to absorb impact and isolate engine vibration in cabs.

- Typical applications include the isolation of motors, gearboxes, differential cases, cabins, and others.
- Conical bearings can be used for loads from 2,600 N to 30,000 N.
- They are available from stock in six different sizes, each in different rigidities and breakaway-proof by the use of stop discs.
- The directional stiffness allows a good vibration isolation in the vehicle transverse direction and sufficient rigidity in the direction of travel for the suspension of shock and braking forces.



APSOplast® Visually recognisable plastics according to FDA and EC 1935/2004



These visually recognisable blue plastics stand out clearly from the colour of processed foods and help with the visual inspection of food. Any fragments of a plastic component can be recognised quickly. The optical recognition is economical and has proven to be successful in a variety of applications in the food industry. Our customers have successfully used blue plastics not only in food processing machines but also in pharmaceutical and medical devices.

These plastics are suitable for direct and indirect food contact according to FDA and EC 1935/2004. They are available as POM-C and PE-UHMW in plates and rods.



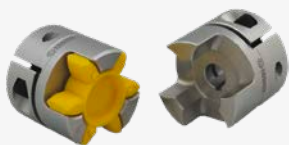
APSOfluid® TETRAFLEX® S PTFE hose lines



PTFE (also known as Teflon™) is one of the most versatile plastics on the market: It has almost universal chemical resistance and withstands temperatures from -60°C to +260°C. Our TETRAFLEX® S PTFE hose assemblies have an inner tube made of this unique material and are therefore suited to a wide variety of applications. Due to the external braiding made of stainless steel, the pipes also withstand high pressure and have good kink resistance. The pipe connections can be individually adapted to the customer's wishes: Normal closing, custom-made, stainless steel or galvanized steel. The selection of TETRAFLEX® S PTFE pipes is also varied: they are available in diameters DN 5 - DN 25, in antistatic versions or with multi-layer braiding for particularly high pressure resistance.



Backlash-Free Couplings



With their high torsional stiffness and ability for angle preserving torque transmission our compact backlash-free couplings are able to achieve the highest positioning accuracy. We offer you two model ranges such as metal bellow and elastomer backlash-free couplings. The metal bellow coupling has high torsional stiffness and angle-preserving torque transmission. The elastomer coupling is vibration-damping and electrically insulating. After the easy installation they are almost completely maintenance- and wear-free and can therefore assure the durability of your drive applications. Examples of applications are drives with high position accuracy such as positioning drives, stepping motors and linear units.



APSOvib® Hinged foot



APSOvib® Hinged feet with glass fiber reinforced polyamide are available from stock with the diameters 40, 50, 65, 83, 103, 123 mm. They are suitable as leveling machine mounts thanks to their high load capacity and the possibility to be oriented +/- 15°. They also have a high corrosion resistance. Depending on the application we offer them with galvanized or stainless steel screws.

Thanks to an anti-gliding rubber pad on the base, the risk to damaging the floor is minimal. This is a specific machine mount for machines, logistic, food and beverage, chemical and pharmaceutical, gastronomy and hotels, domestic appliances, etc. This APSOvib® Hinged foot is an excellent universal leveling machine mount with great value for money!



Simply good – Angst+Pfister's online – shop

Simple to order, high quality, dependable delivery times: This is the philosophy of the APSOparts new online shop – the digital product world of Angst+Pfister. APSOparts is even less complicated in its new guise. A team working in the background uses extensive expertise to respond transparently and flexibly to current supply shortages in purchasing.

APSOparts launched its new online shop in the autumn of 2021. "Ordering has become even easier with the Angst+Pfister Group's updated digital channel," Rainer Senn, Head Customer Services & Marketing for APSOparts, is pleased to report. A lot of emphasis has been placed on user-friendliness and clear presentation.

Simple – but with the same high quality

And a great deal of time has been invested in the newly-revised online shop. APSOparts aimed to meet a customer need that had been intensifying during the pandemic: Online shopping has been important beyond B2B for some time now and technical trade customers are increasingly keen to take advantage of it. It's now possible to compare different offers and orders within a few minutes, at any time of day or night – ideally without external assistance. This is why using the new online shop has been made so easy. The requirement for quality products and efficient delivery processes stays the same says Rainer Senn: "We deliver on the date

given in the same high quality." An experienced team takes care of this, in 2021 about 130,000 individual orders were sent out to customers across the whole world. Internal processes are continually being adapted in line with market activity.

Purchasing flexibility and transparent delivery dates

In addition to plastic semi-finished products, there is an extensive assortment of sealing technology products to choose from – in collaboration with suppliers and our own products. The range is augmented with high-quality standard products for fluid, anti-vibration and drive technologies. Availability and in-stock quantities are continually adjusted to the market and customer demand. "We are in a position to respond rapidly and flexibly," says Rainer Senn. This applies equally to products with or without certification. The Angst+Pfister Group specialists have been using their wide-based knowledge of the market to combat current shortages and supply shortages in the purchasing

market. They check on a daily basis how and where to buy in order to keep APSOparts' range as available as possible. "At the moment, it's inescapable that some delivery times can change on a weekly basis," says Rainer Senn. They have to be continuously updated on the online shop so that customers always know exactly where they stand. Occasionally, products become unavailable and are removed from the shop.

Support and consultation

The extensive range makes APSOparts a versatile and valued partner for C-parts management. And also because an efficient, multilingual back office team has been taking care of all customer concerns and suggestions for many years. When a consultation is required regarding materials, applications or design, the project is forwarded right away to the Angst+Pfister specialists.

If customers have any questions about the new shop, products or prices, they contact support@apsoparts.com.

Incoming goods inspection procedures are far simpler thanks to the ISO 9001:2008 and ISO 14001:2004 quality assurance system



What customers say
"The clear presentation helps with product selection"



New design and more features

PROKASRO

The medium-sized business ProKASRO Mechatronik, with 160 employees, designs sewer rehabilitation solutions and markets them primarily in Germany and Europe, and increasingly Asia and America. In order to deal with the present shortages, ProKASRO optimises its purchasing processes continually while checking availability. APSOparts is a great system to get this done as Maria Strobel, Head of Purchasing, reveals in a short interview.



Maria Strobel, how, and how often, do you order from us?

Around 230 of our 14,000 listed stock articles are from APSOparts. We order between two and seven times a month – these days everything is ordered online through the shop, no longer by email.

Has the relaunch changed anything?

It's even easier to place an order. But, then there never were any problems with the old shop either.

Is there anything else we could improve?

Sometimes, after an order has been placed, there might be something to change, such as an increase in quantity. At the moment, this still needs to go through Support.

What do you value most about the new shop?

The easy-to-understand product search system makes for efficient ordering. Which means images, descriptions and information such as availability, product sizes, material and product information and data sheets are clearly presented and easy to access. That really helps when selecting a product.

Have you felt the effects of the present shortages in your purchasing markets?

Shortages are massive in automation and electronics. There are not always alternatives. The situation changes almost daily. That's why we also optimise our ordering processes on a daily basis. Replenishment lead times and availability are continually checked against orders. The up-to-date APSOparts information is very helpful for us.



Key features



O-ring Expert



Product finder



DirectCut



DirectUP



1D and 2D configurator



3D files download



Print product offer



Availability in real time

Services

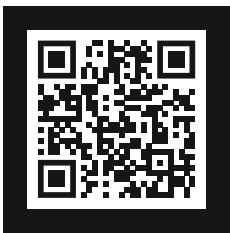
The Angst+Pfister Group supplies its services to every corner of the globe. We are offering solutions tailored to the customer's specific needs with our local application specialists. We are providing engineering-lead solutions to thousands of original equipment manufacturers in over 50 countries.

Production Platform

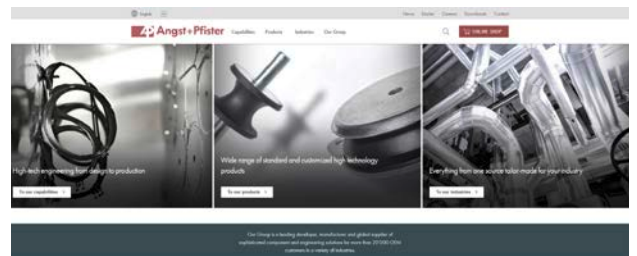
Our global production platform spans across 15 countries. In addition to our own state-of-the-art manufacturing, we have reserved capacity with internationally renowned production partners. This allows us to always select the best production location based on our customers' quality, quantity and delivery requirements.



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