

# magazine

INTERNATIONAL ENGINEERING SOLUTIONS

## WELL ADVISED

How market leaders maintain top positions thanks to production and material expertise, optimal supply chains and leading engineering: LAG AG Trailers is building more and more Angst+Pfister components into its trailers.

## PROFITABLY NETWORKED

When requirements become complex, high-performance elastomers from Angst+Pfister bring the worry-free ticket to global markets. For AVS Römer, know-how from the entire value chain flows into a single material.

## NEWLY THOUGHT

Real engineering challenges: How co-design creates new approaches is demonstrated by a silicone seal for a vibrating weigh feeder from Coperion – better than planned.



# Editorial



Dear Reader,

Trust is important. Most of all, it is important in challenging times. It helps to overcome uncertainty. The Angst+Pfister magazine 2021 documents a year of high performance by teams who were, to some extent, only able to stay connected virtually. Knowing that you can count on employees and partners, when you suddenly hardly ever see them, is only possible when trust is in place. So, first of all, I would like to thank everyone with whom we have built a partnership of trust over the past years – our customers, employees and suppliers. Many of them are now old hands at working on our projects in across-the-board teamwork. Trust has been the key to us holding up well, even in the midst of a global pandemic.

This was not without grounds. Firstly, we had already established a strategy based on great customer relationships and efficient networks of skilled professionals. Secondly, there is technology. We are pushing ahead with game-changing digitalisation - both in engineering and communication. Networked virtual work, access to and exchange of knowhow at a distance, support from the distance - we

already had all this implemented and running smoothly. As lockdowns began to be instigated across the planet, our systems came into their own, and our teams were already proficient users and could continue working as normal. In engineering, we even made further advances in testing, software and faster computation. Strong relationships and technology experience have given us a resilience that reinforces our efforts to be, and remain, a dependable partner for you, our valued customer.

Our international teams of experts have responded to this extraordinary year by expanding and developing our "Sm@rt Engineering". The key component is a central hub that concentrates and organises the technological knowledge of our worldwide, interdisciplinary networks – it holds for example, the latest developments in approvals, durability testing and lifetime calculations. We make all of this transparent for projects with our customers and partners. This is how we create another basis for networked, intelligent product development and successful innovations.

Our experts are passionate about Sm@rt Engineering. We can't wait for the 2022 issue of the Angst+Pfister magazine to tell you more. For the time being, we are happy to bring you the 2021 issue. In addition to the usual inspiration you have come to expect from us, this issue is also intended to deliver a note of confidence. Even when times are difficult in some places – as long as dedicated people seek solutions together, optimism is vindicated.

With this in mind, I wish you an enjoyable read.

Erich Schmid  
Chief Technology Officer



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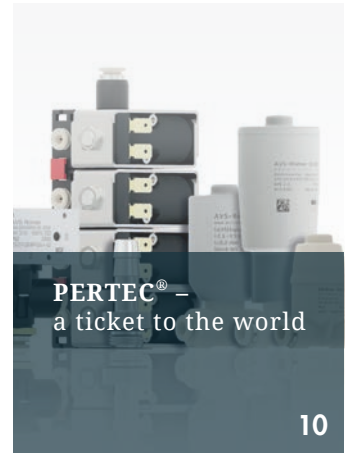
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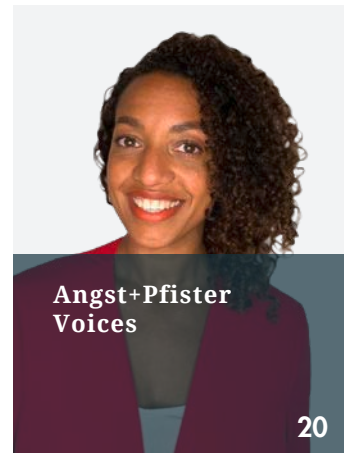
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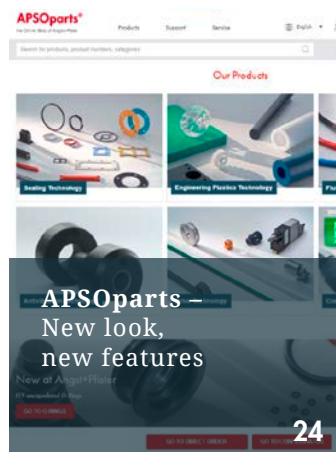
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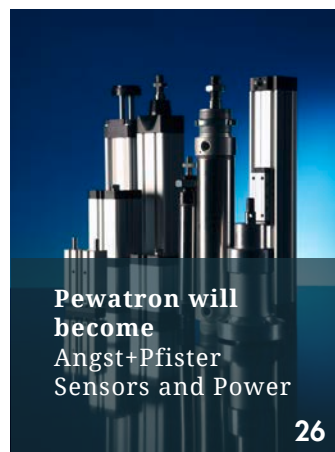
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**i** Do you have any further questions about one of the magazine topics?

or call **+41 44 306 62 57**

We will contact you immediately.

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# Quality partnerships – for products with key benefits

Work together, grow together – Angst+Pfister commits to winning over customers on the basis of performance for every single project, while delivering market advantages for the customer. This makes for great partnerships. And is also the reason the Belgian company LAG Trailers switched step-by-step to seals made by Angst+Pfister. As market leader for silo semi-trailers in the Benelux countries, LAG today requires seals that are food approved, made with the best production method to guarantee top quality – and with optimised production and logistics so that the price is also a winner.





Years of innovation and growth mean that LAG Trailers is today a leading manufacturer of road transport vehicles – including the tipping silo semi-trailer. The most popular one is the undisputed market leader in the Benelux countries. LAG is not only at home in the Benelux countries but also has sales and service centres in Scandinavia, Great Britain, Germany and eastern Europe. The company is headquartered in Belgian Bree and employs around 430 skilled and experienced workers.

### Performance that impresses

Angst+Pfister has supplied LAG with fluid technology for some time now, more specifically the Storz couplings that simultaneously contain silicone or PTFE seals. “When talk turned to this type of seal, this was when our team became involved,” relates Jan Boomsma, Product Application Engineer, Sealing Technology. The package of couplings and seals offered the customer definite benefits. As a result of the positive experience of this project, LAG came back to Angst+Pfister when looking for a supplier for other seals. This time the seals were required for the hatches and filling ports of the silo semi-trailer – with relatively large diameters between 432 and 700 millimetres. The hatch and filling ports are closed with a cap, and the seal had to be attached to the silo semi-trailer itself.

As the silos also carry food stuffs, the seals have to have the corresponding approvals. LAG utilises NBR rubber (nitrile rubber) to deal with fatty or oily tank loads and requi-



*Sealing rings with large diameters are injection molded: They remain within the tolerances and simplify assembly on the silo trailers.*

res approval from the Food and Drug Administration (FDA) of the United States of America. “Angst+Pfister offers a wide range of materials. In our range, we have a standard product of NBR rubber with approval for use in the food industry,” recounts Jan Boomsma. The homework for this section of the requirements had already been completed.

### Consultation for production processes

“It is not easy to find seals like these of a reliably high quality,” says Rudi Langens, Senior Approvals of LAG Trailers N.V.. However, the engineers of Angst+Pfister were able to offer the desired seals in two versions, and explained to the customer the differences in price and quality. On the one hand there were cheaper extrusion parts designed as rings. “On the other hand, we suggested a pure injection moulding method whereby the parts are vulcanised to rings,” explains Jan Boomsma. In addition, Angst+Pfister suggested three different contractual periods which would guarantee the customer a set price for a set period of time. This allowed Angst+Pfister to optimise the production volume and processes, and make them economical – to the benefit of the customer in terms of price and logistics.

“In principle, it was a simple seal, but if there was not going to be a clean fit there might be problems with closing and opening the cap – or the seal might be dislodged from the groove. Injection moulding has a distinct qua-

lity advantage in this case – due to the smooth surface and the exact dimensions for serial production,” notes Jan Boomsma. Injection moulding parts seal better and are better at keeping within the tolerances. They are accurate to within 0.2 millimetres – in comparison to the 0.8 millimetres of extrusion parts. That makes assembly easier and the rings more durable. This is why LAG went for the more expensive injection moulding parts with a supply agreement across the entire supply chain for two years.

### Growing together

“I visited the customer several times during the project and discussed numerous details with their engineers and buyers,” says Jan Boomsma. Open communication with the customer is absolutely crucial for projects like these – and for the engineers of Angst+Pfister the insights gained are always interesting. It is a matter of winning the trust of the customer. “As the quality of these seals is exceptionally important for our silo semi-trailers, we approached this project with a great deal of care,” says Rudi Langens. Angst+Pfister responded in a very professional manner – right through from the sample tests to serial production.

LAG has been using the seals for over two years now. “The quality and availability is first class,” extols Rudi Langens. For this reason, LAG has switched step-by-step to Angst+Pfister for all similar components in order to ensure quality and quantity. “The professionalism and knowledge of the engineers convinced us to broaden our partnership.”



«Injection moulding has a distinct quality advantage in this case – due to the smooth surface and the exact dimensions for serial production.»

Jan Boomsma, Product Application Engineer, Angst+Pfister Netherlands

# O-rings in orbit

When young engineers dream of space, Angst+Pfister is happy to make the dream a reality – with lots of down-to-earth technical experience for their special requirements. Students of the Swiss ARIS Space and Rocket Project looked to Angst+Pfister for seals in their bid to win an international rocket competition.



An ambitious team of students from the ETHZ Swiss Federal Institute of Technology in Zurich is reaching for the stars – following in the footsteps of Switzerland’s internationally-renowned education establishments, which have produced no less than 21 Nobel Prize winners. The students plan to launch a hybrid rocket in a far off place where the air is very thin.

## A step at a time into the stratosphere

ARIS stands for Akademische Raumfahrt Initiative Schweiz. It was founded in 2017 by students from the ETHZ and incorporates the neighbouring science universities of Zurich and Luzern, while also being closely linked with the innovative industry of Switzerland. The students see space as a future enterprise and business sector. Their initiative aims to inspire the next generation, for whom space should be more than just a dream. By 2029, ARIS would like to have reached orbit – and are putting this plan into action step by step. The next stage for the students is to win the Spaceport America Cup in New Mexico, initially in the 30,000 ft category – in which the rocket has to reach as near as possible the exact height of 30,000 ft, that is about 9,100 metres.

The concomitant Euler 2020 project is a homage to the Swiss mathematician Leonhard Euler, one of the most brilliant brains of the 18th century. As part of this project, the height of 30,000 feet will be attained first off using a commercial engine. Simultaneously, another student team will be working on another project, the Iride 2020, to design and test their own engine. A further team of students will then build the engine into the rocket during 2021 and attempt a first flight. The students are not exactly lacking in ambition.

## A shared passion for technology

Angst+Pfister products have already been used in an earlier ARIS project. “The seals are incredibly important for the engine,” says ETHZ student Julius Wymann. “If they do not work, the result can be a loss of power and system damage. For this reason, we needed specialist and professional knowhow that extends beyond classic sealing solutions, and so once again we knocked at the door of Angst+Pfister.” There they found Yves Riedo, Senior Engineer in Sealing Technology who was instantly impressed by the energy of the team of students. Julius Wymann explains: “Engines hold a strong fascination for us; we all share the same passion.” The interaction of power, control and elegance is capti-

vating – the vibration of a rocket engine is like nothing else.”

But when it came to the seals, the students were in less familiar territory. “Finding the exact dimensions is a science in itself,” explains Julius Wymann. They primarily experienced difficulties with the design of the seal for the nozzles. These are made of copper that expands significantly in high temperatures. “A sealing point for O-rings looks easy,” says Yves Riedo. However, room constraints, the exact pressure on the O-rings and the changing physical state of the media make for a more complex situation as materials expand at different rates. “The design of the groove - the slot for the O-ring – and the choice of material require depth of knowledge and experience.”

## Materials for top performance

The students also needed special materials that are able to withstand extreme stress. Yves Riedo reached deep into the vaults: “One of the materials we used was perfluoroelastomer with a selling price of several thousand euros per kilogramme.” The material allowed the students to carry out the maximum number of tests – without having to replace the seals and dismantle the engine every time. “If you want to win, you have to be better than the competition,” says Yves Riedo with a twinkle in his eye. The engine required a complete sealing system of 17 O-rings in six different dimensions, and a combination of five different materials. There had to be seals between the injector and





«The design of the groove – the slot for the O-ring – and the choice of material require depth of knowledge and experience.»

Yves Riedo, Senior Engineer Sealing Technology, Angst+Pfister Group



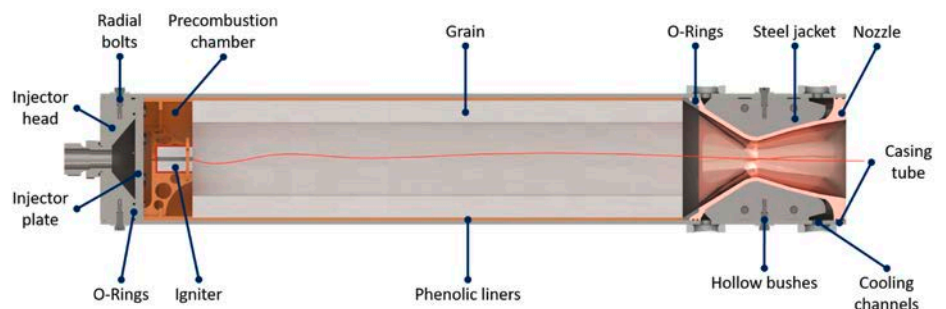
combustion chamber, the combustion chamber and outlet nozzle, for the cooling system within the nozzle with the connections to the casing and the plenum chamber, as well as for diverse sensors within the injector (see illustration). In addition to the perfluoroelastomer (FFKM) already mentioned, an ethylene propylene diene monomer elastomer (EPDM), a fluoroelastomer (FKM) and a fluoroelastomer (FKM) with a seamless FEP lining (FEP-O-SEAL®) were used.

The engine will be filled with an explosive oxidising agent that is warmed to reach a pressure of around seventy bar. In operation minus temperatures are encountered briefly in the injector and also temperatures up to

+2800 degrees in the combustion chamber. Consequently, the sealing system will be confronted with conditions of extreme chemical and thermal stress and needs to function reliably several times. “We use nitrous oxide as the oxidising agent combusted with sorbitol. It also contains paraffin and aluminium,” says the ETHZ student. “The special material that we selected to use gives us a clean seal on the copper outlet nozzles no matter how high the temperatures or size of expansion gap. The seals on the injector, meanwhile, fulfil the requirements of nitrous oxide fully.” With New Mexico clearly in sight: It’s not going to be a matter of the materials...

#### Engine cross-section

On the left is the injector plate for the liquid oxidising agent that on injection is atomised and vapourised. The injector has to remain sealed for both physical states. The oxidising agent then reacts with the gradually vapourising fuel (grain) in the combustion chamber. Pressure is generated by combustion of the gas mixture, which is transformed into kinetic energy by means of the copper Laval nozzles. And in accordance with the rocket principle produces the thrust of the engine.





## New rubber vibration dampers for lightweight components

A small pump making a lot of din. For the coffee machine manufacturer Franke, the engineering expertise and inventiveness of Angst+Pfister contributed to consumers' enjoyment of not only coffee but special moments too. A space-saving rubber vibration damper with a snap-on connection absorbs the vibrations of lightweight components – making assembly easier and logistics simpler.



«The stud and catch are highly versatile – be it for pumps, engines, fans or electronic components in kitchen machines or laboratory equipment.»

Jennifer Scherhag, Product Application Engineer, Antivibration Technology, Angst+Pfister Group

“During a visit to Franke, a prototype of the coffee machine A400 was opened to investigate its noises and vibrations,” says Jennifer Scherhag, Product Application Engineer at Angst+Pfister. Franke Kaffeemaschinen AG had fitted the latest generation of the A400 with a special fluid pump, which runs at a speed of 3000 min<sup>-1</sup>. This is the equivalent of 50 Hertz. The noises produced exceeded the desired noise level.

### Bringing know-how on-site

“Antivibration technology is a complicated subject. Many people are reluctant to get involved,” explains Jennifer Scherhag. Angst+Pfister has positioned itself as an effective engineering partner with far more to offer than the implementation of production drawings. “We also look at all the so-called details in small devices.” Franke’s A400 is

making professional full automatic machine technology available to everyone: convenience shops, retail, offices, the hotel trade, bookshops and bakers – in other words, premium enjoyment also for small businesses everywhere. Franke’s approach is: “It’s about more than coffee – it’s about the moment.” And loud vibrations ought not to spoil it.



The fluid pump was transferring vibrations to a plate, even though it was attached to it with rubber corners. This plate, in turn, was also connected to the machine base and transferring vibrations through to the housing. This was creating the unwanted noises. A look inside the open machine revealed to Jennifer Scherhag: The plate would have to be uncoupled. Usually rubber vibration dampers are the solution. “However, the pump is relatively small and weighs just about 650 grams. Very small, soft antivibration elements were required. But there was no such thing around.” Jennifer Scherhag took out her pocket calculator and worked out the required stiffness to meet the noise specifications, and suggested to the Franke technicians that they jointly develop new rubber vibration dampers.

### Overcoming barriers

There were several new challenges to be faced in developing the vibration dampers. The machine housing had already been engineered – as had its tools. The spatial conditions allowed a vibration damper height of just about ten millimetres. “For the softness of the vibration dampers that we were aiming at, more height, of course, would have made sense,” said Jennifer Scherhag. The housing already included M4 screw threads. This was where a very soft, but equally small vibration damper with extra large thread was needed. The standard products in this size have smaller M2 or M3 threads. Further requirements: It had to be easy for Franke to install the vibration dampers - during servicing as well. And, of course, the market launch was fast approaching.

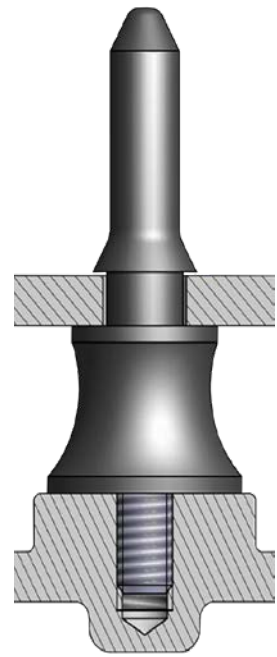
Three small vibration dampers with about the calculated stiffness were found in Angst+Pfister’s logistics warehouse – but they were all too long and the thread too small. However, they could be used for the first vibration tests. One of the vibration dampers seemed far more promising than the others – with the optimum stiffness. The noise values fell under the desired level. The next step was to tackle the 15 millimetre construction height and M3 thread – with a new design. Jennifer Scherhag used a measuring device to determine the critical force displacement curve and then reduced the size of the design to ten millimetres. Meanwhile, Angst+Pfister Turkey was taking care of the rubber formulation – it had to have the same

stiffness as the standard vibration damper under test. “This rubber vibration damper still had two threads to fix it to the plate and also the machine housing,” says Jennifer Scherhag. Hence, the next problem to arise was assembly: Because the vibration dampers were so soft, they twisted as they were screwed in, which meant the rubber would be damaged.

### Finding new approaches

“During a brainstorming session, we had a good idea,” says Jennifer Scherhag still pleased. “I was always a fan of the snap-on connection – a simple principle with multiple applications.” So she reworked the design and replaced the thread on one side with a stud and catch. By these means, the plate could be fixed by hand without any threading motion. This pleased Franke Kaffeemaschinen AG. However, time was running out. It seemed too risky to Franke to invest in a tool without further tests being carried out; discontinuation of the project threatened.

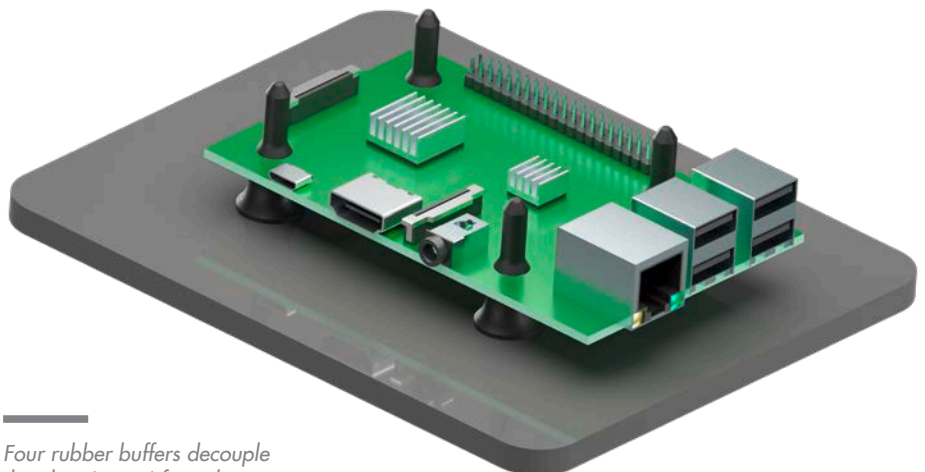
Jennifer Scherhag’s thoughts turned to 3D laser sintering. With this process Angst+Pfister could manufacture a prototype from laser sintered rubber within seven days. Manufacture took place at Angst+Pfister in Turkey. Thanks to the prototype, the snap mechanism could be tested – and it worked. The A400 is now delivered with it and ensures many special moments for the consumers. The new-style rubber vibration dampers mean that Franke now has a twenty to thirty second shorter assembly time and far easier logistics – without screws, nuts or washers or the corresponding tools.



Achieving the goal with design expertise: Thanks to an overall height of just 10 millimeters, an oversized thread (bottom) and a snap fit (top), the very soft rubber buffer eliminates loud noises.

### Knowledge sharing

Jennifer Scherhag would like to make her vibration damper innovation available to other customers: “The stud and catch are highly versatile – be it for pumps, engines, fans or electronic components in kitchen machines or laboratory equipment.” They simplify logistics, speed up assembly and reduce costs.



Four rubber buffers decouple the plate (green) from the machine housing.

# PERTEC® – a ticket to the world

Aiming to generate market opportunities for customers, Angst+Pfister inputs knowledge and the latest technology along the entire value-added chain of components. Similarly to fitting the pieces of a jigsaw puzzle together, more and more solutions are being created for the challenging markets of today – for example, the PERTEC® fluoroelastomer rubber for AVS Römer: an entry ticket to global markets that replaces the need for multiple materials and complex logistics.



Angst+Pfister's relationship with this customer goes back many years, and time and again, it has yielded benefits for both parties: AVS Römer is a leading manufacturer, producing 6300 products in-house, such as screw connections, magnetic valves and sensors. The company is based in Grafenau, Germany with about 350 employees and deeply committed to applying its experience and knowledge in providing training for the technical professions. AVS Römer supplies many major companies with its products. These include the food, medical and chemical industries.

"A key customer segment is the coffee machine industry – just as it is for Angst+Pfister," says Yves Riedo, Senior Engineer Sealing Technology. A project that has now been completed involved the sealings for quick couplings, valve components and screw connectors (see figure) for a range of global industries. "This meant a whole raft of approvals had to be obtained," explains Yves Riedo. The O-rings and moulded seals made by Angst+Pfister are integrated directly into these products.

## Bringing skills together

Until recently, AVS Römer was, of necessity, using different materials – depending on the application: food, drinking water or gases. This was because no single material exhibited all the required properties. Alongside approvals for various markets, durability under exposure to chemicals and extreme temperatures is also a requirement: The seals have to comply with the standards for drinking water and food applications, and also be able to withstand steam and cleaning solutions. "It is a fact that cleaners and descalers are now more aggressive and place higher demands on all the parts with which they come into contact," relates Yves Riedo. And temperatures are becoming more extreme. In the past, ethylene-propylene-diene rubber (EPDM) was the go-to material. Today's conditions mean that the problem of durability is likely to be a recurring issue. For this reason, fluorinated rubbers (FKM) are being used more often now. "But it's more difficult to get approvals for them," says Yves Riedo.



O-ring

In 2016, Yves Riedo informed AVS Römer that Angst+Pfister would be in a position to manufacture one material suitable for all applications and markets. The positive reaction of the customer encouraged him to get its development started at Angst+Pfister and to formulate a new compound from the PERTEC® product line (see box). Innovative projects like this always benefit from Angst+Pfister's business model. "We transfer requirements and knowledge to the entire value-added chain of the components – from the compounders to the producers and marketing to the customer," says Yves Riedo. And the customer benefits directly from optimal use of the latest technology. "This is why it is always like fitting a jigsaw puzzle together."

## Understanding materials and markets

In its own production facilities Angst+Pfister developed an all-rounder compound that unifies all the standards and regulations. The requirement specifications defined the most important demands that would be made on the material. From there it went to compounding. "In talks with the customer, compromises were sought so that ultimately the chosen formulation would win through in all points," recalls Yves Riedo. The cost of having a compound certified very quickly reaches several tens of thousands of Swiss





«If you want to supply all of Europe, you have to comply with the regulations of each member state, for example, those of the German Foods, Consumer Goods and Feedstuffs Code (LFGB) as defined by the German Federal Institute for Risk Assessment (BfR) or the French Arrêté in France.»

Yves Riedo, Senior Engineer Sealing Technology, Angst+Pfister Group

### PERTEC® UP FKM

The PERTEC® product family is Angst+Pfister's solution to strict regulation across different industries in different international markets for multiple applications – whenever top performance and quality are required. "UP" stands for a promise: ultra pure. The polymer was designed specifically for the pharmaceutical, food and medical industries on the ba-

sis of the need to protect human health. PERTEC® UP FKM is remarkable for its mechanical capabilities – in a temperature range of -20 to +200 degrees Celsius. The material is also extremely resistant to chemicals such as aggressive cleaning products.

francs, and takes two to three years. The new mix offers AVS Römer a 'worry-free package' for approvals and logistics as only one single material has to be managed. "This is why it makes a great deal of sense to do this, even though our material costs that bit more," says Yves Riedo. It also complies with the standards of the "Bureaux National Interprofessionnel du Cognac" (BNIC) and, as such, is even suitable for deployment in the production of brandy.

PERTEC® UP FKM combines many globally relevant food approvals and a drinking water approval in the PAH category 1. PAH stands for polycyclic aromatic hydrocarbon, listed by the International Agency for Cancer Research as proven to be, or at least suspected as being, carcinogenic. PAH category 1 is the class with the strictest maximum permitted levels. In addition, it also has approval from the Federal Institute for Materials

Research and Testing (BAM) for gas applications. "Hence, our rubber compound brings several unique advantages to the market," says Yves Riedo.

Angst+Pfister today supplies AVS Römer with O-rings in around fifty different sizes and several moulded parts made from PERTEC® UP FKM.

### Globally relevant approvals for the food and drinking water industries

Suppliers to the global drinking water and food industries need to be well informed about a whole range of standards. And additionally, for a number of years now, this has also included several migration tests or positive lists. These regulate the exclusion of harmful substance leakage from rubber compounds, or specify which additives are permitted. In the USA, this is dealt with the standards of the Food and Drug Administration (FDA) or the National Sanitation Foundation (NSF). In Asia, particularly China, it is the mandate of the GB Food Contact Standards. Then again, other standards and laws apply to the Mercosur region and the entire market of the South American countries. The European Union also regulates these industries; "If you want to supply all of Europe, you have to comply with the regulations of each member state, for example, those of the German Foods, Consumer Goods and Feedstuffs Code (LFGB) as defined by the German Federal Institute for Risk Assessment (BfR) or the French Arrêté in France," states Yves Riedo. In this way, the whole union can be covered.



#### USA

FDA 21 CFR 177.2600 a) - d)  
(Positive list)

FDA 21 CFR 177.2600 e) - f)  
(Migration test)

NSF 51 for food

3A Sanitary standard no 18-03



#### Europe

EC 1935/2004

- BfR - Germany
- LFGB § 30/31 - Germany
- French Arrêté - France
- D.M. 21/03/1973 - Italy



#### China

GB 9685-2016  
(Positive list)

GB 4806.11-2016  
(Migration test)

GB 4806.1-2016  
(Food law)



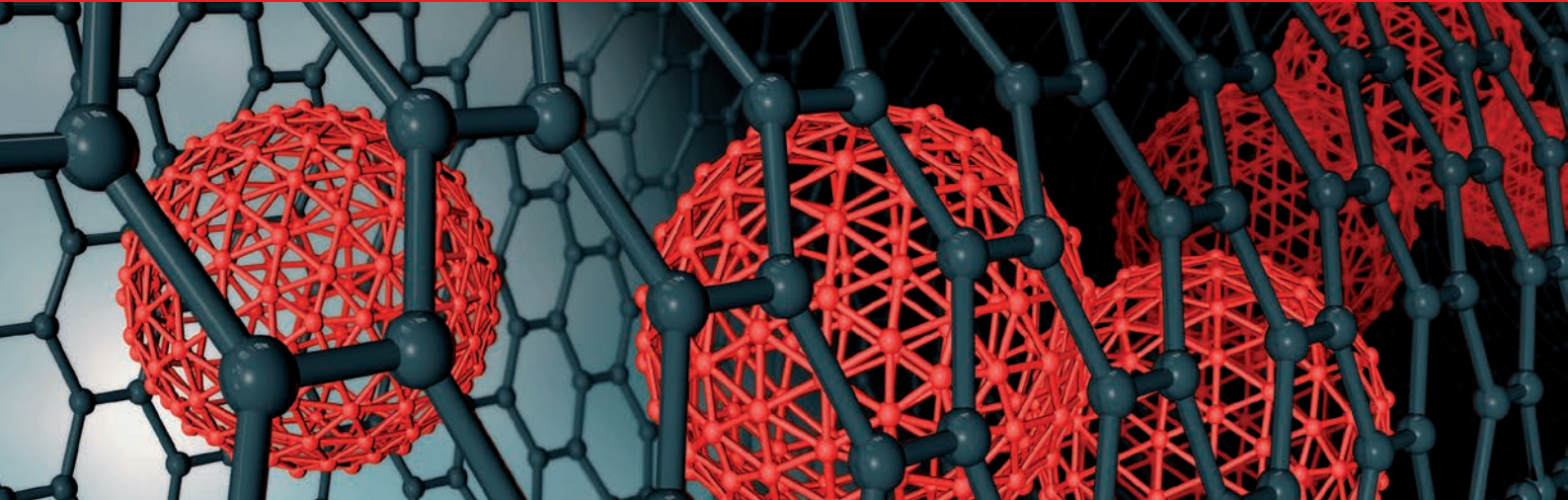
#### Mercosur (South America)

Mercosur GMC 28/99  
(Positive list)

Mercosur GMC 54/97  
(Migration test)

Mercosur GMC 03/92  
(Food law)

# PERTEC® – the high-performance material



Performance requirements for materials are high and becoming higher across all industries: Materials have to withstand conditions more extreme than ever before, such as high or low temperatures, aggressive liquids, gases or extreme physical stresses – and this with the expectation of the same or even longer service life. It is often a matter of guaranteeing the operational safety of machines and systems. In addition, the materials have to meet increasingly stringent legal requirements. These materials are rightly referred to as high-performance compounds.

As these challenges become more demanding, anyone who wants to win through in international competition has to be able to count on their operational facilities running smoothly without a hitch. This requires machinery that lasts in order to avoid production downtime and operating losses. It goes without saying that a machine's durability depends substantially on the quality of its components. Consequently, component materials will always require further development to adapt to new conditions and continually improve them. In this regard, compounding has become one of the key fields in engineering when it comes to

high-performance elastomers. It is essential for application producers to know they have a specialist technology partner that they can rely on – with excellent blending and development capabilities.

For many years now, Angst+Pfister has recognised the major importance of compounding for its customers, particularly its significance for the future and can lay to claim to significant experience in this area. Acquiring these skills was just the beginning – over the years, they have been constantly upgraded, extended and improved: Customers should be able to expect custom solutions at all times for increasingly challenging conditions – and in line with the most recent technological developments. For Angst+Pfister this means continuous learning, research, investing, and testing.

Elastomer compounding for sealing and antivibration technology is as much an art as a science. The expert combination of polymers and additives, and correct kneading time ensures that the resulting vulcanised elastomer bond has the desired physical properties and performance. And it means that the raw ma-

terials have good flow properties for processing and waste is minimised. Angst+Pfister knows that the bedrock of effective and efficient solutions is materials engineering and chemistry knowledge combined with development expertise and experience – as demonstrated by a comprehensive collection of formulae.

Angst+Pfister's PERTEC® is a newly developed generation of high-performance elastomers with excellent material qualities for a range of industrial uses. The ever expanding PERTEC® family includes various high-performance elastomers that have been granted all the international industry approvals. The back catalogue of projects, and satisfied customers, show that with PERTEC® Angst+Pfister has created a new high-performance material able to meet custom requirements for sealing technology solutions at the highest technological level. And that is not the end of it. Angst+Pfister analysed the markets and identified segments where new, high-performance compounds would bring significant improvement in industrial applications and offer customers a decisive competitive advantage.

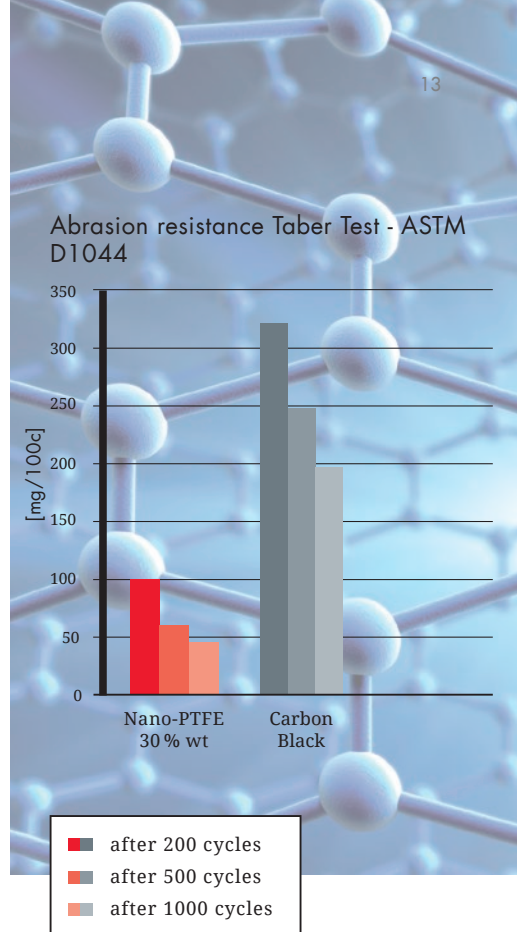


## PERTEC® NP FKM

In contrast to the conventional coating of materials, a new class of peroxide-cured PERTEC® NP FKM compounds has now been developed to improve performance based on nano-PTFE, prepared using the microemulsion technique – with extraordinary properties. It has very high abrasion resistance, is highly resistant to chemicals, and has a very low permeability. In spite of its high degree of hardness, it has very good tensile strength and contains no metal ions. This compound is available in a Shore A hardness of 70 – or in a harder version with a Shore A hardness of 80 for applications where high pressure is involved.

The advantages compared to the conventional method with PTFE powder are: avoidance of material accumulation, homogenous dispersion, an up to 40% higher degree of filling (cf. 6% for PTFE powder) for simultaneously good mechanical properties.

Angst+Pfister products typically made from PERTEC® NP FKM, are O-rings, moulded parts, and membranes, which are particularly suited for valves, pumps, and couplings for the pharmaceutical, food, and chemical industries.

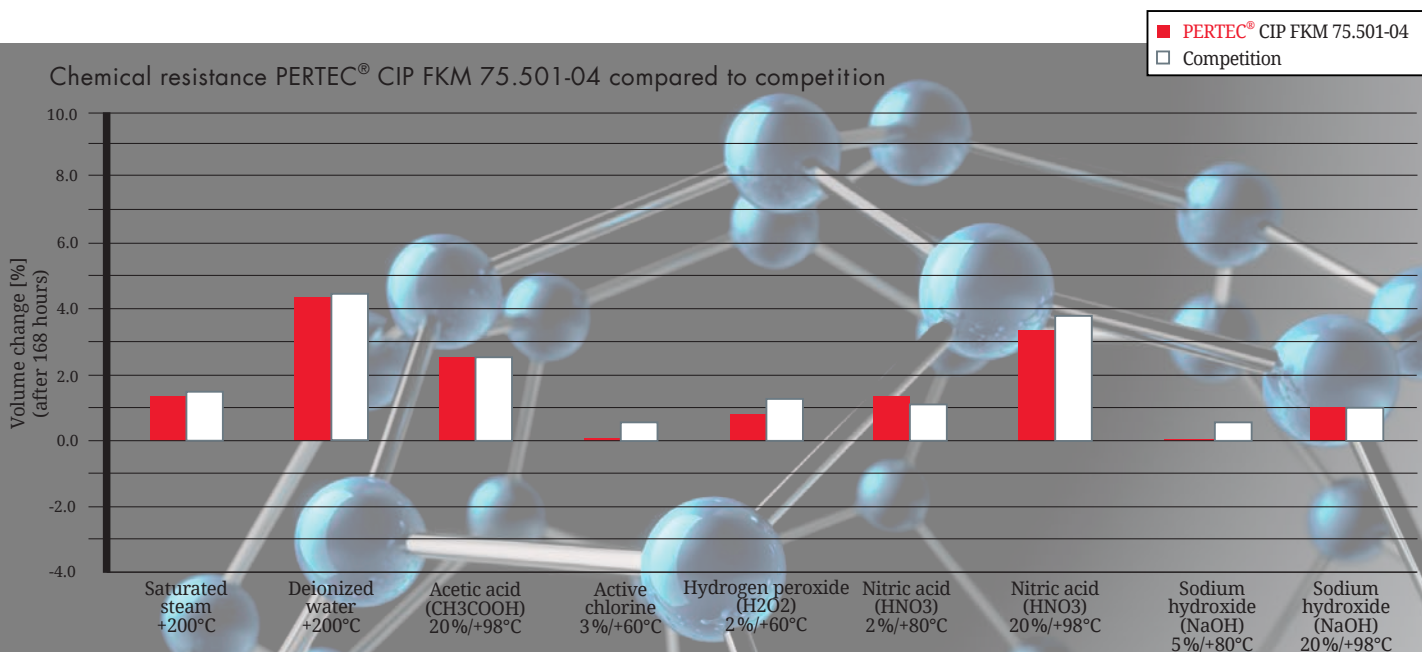


## PERTEC® CIP/SIP FKM

PERTEC® CIP/SIP FKM is a new, specialised, high-performance elastomer developed for use in CIP (Cleaning In Place) and SIP (Sterilisation In Place) systems. It is used in situations where a very high level of hygiene is mandatory, such as in the food processing, pharmaceutical, medical, and chemical industries. Application components and materials in these systems are exposed to aggressive chemicals (e.g. nitric acid or hypochlorite) in cleaning materials, as well as high concentrations of grease and extreme temperatures.

PERTEC® CIP/SIP FKM complies with all essential regulations of these industries. The very high fluorine content of PERTEC® CIP/SIP FKM confers very good chemical resistance and resistance to very high temperatures up to +200 degrees Celsius. It shows very good abrasion resistance and very low permeability. This compound is available in a Shore A hardness of 75 – or in a harder version with a Shore A hardness of 85 for application where high pressure is involved.

Angst+Pfister primarily produces O-rings, moulded parts, membranes and dynamic seals from PERTEC® CIP/SIP FKM for use in the pharmaceutical, food, medical, and chemical industries.



## PERTEC® ST FKM

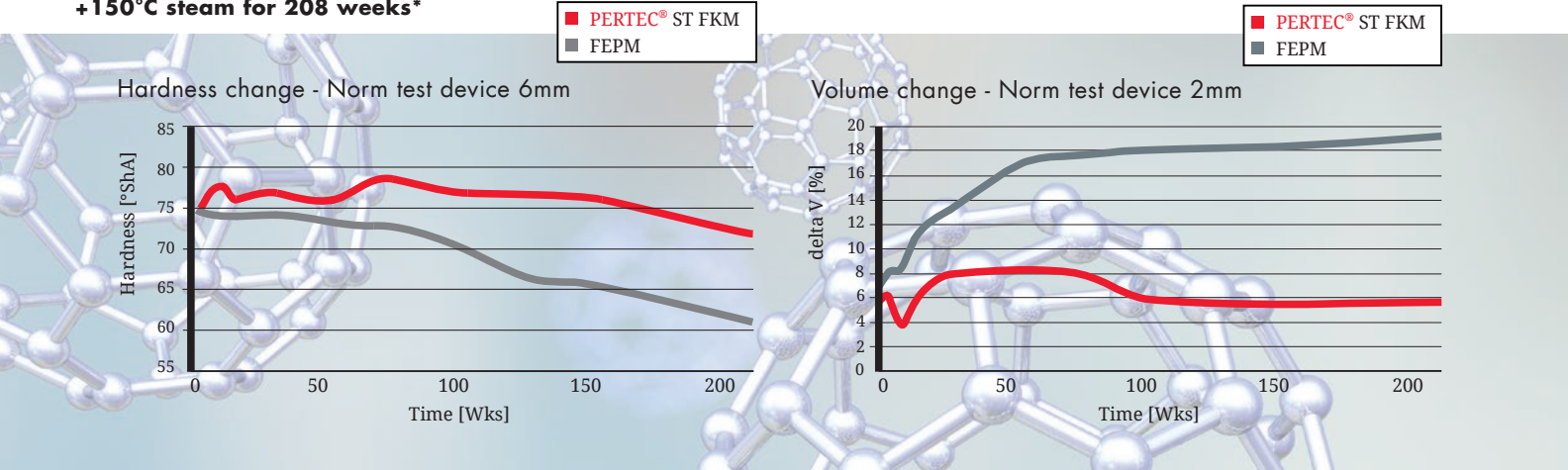
PERTEC® ST FKM is a high-performance elastomer developed by Angst+Pfister that is particularly suited for use in contact with steam and hot water, not least because of its high resistance at temperatures from +15 to +200 degrees Celsius. It is resistant to a multitude of aggressive chemicals, mineral oils, and grease as well as ozone, weather, aging, and is oxygen compatible with very low permeability. This compound is available in a Shore A hardness of 75.

The special mix means processing using the compression or injection methods is very economical and permits flexible and optimal custom production. The result is high quality and competitive prices.

The high concentration of fluorine ensures maximum resistance in exceptionally high temperatures. As a consequence, the material is particularly suitable for steam applications such as steam heating systems, steam injectors, gas atomizers (gas flares) and steam cleaners.

The main applications of PERTEC® ST FKM are O-rings, moulded parts and membranes for couplings, turbines, pumps, and valves, and for uses in the chemical industry.

### Test in the autoclave at +150°C steam for 208 weeks\*



\* This information is based on our available data. These values are measured on standard test specimens and are within the normal tolerance range of material properties and do not represent guaranteed property values. Therefore they shall not be used for specification purposes.

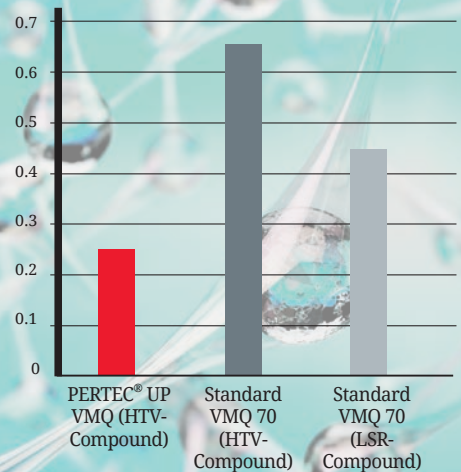
## PERTEC® UP VMQ

PERTEC® UP VMQ is a new high-performance elastomer specially developed for uses in which absolute material cleanliness is mandatory. The name itself says this - UP stands for ultra-pure. The focus lies on uses for the food, pharmaceutical, and medical industries, where complete material sterility is the most important requirement. In these sectors there can be no contamination of the environment by the materials in use. The specific requirements are prescribed in various international regulations. PERTEC® UP VMQ complies with all global food contact regulations. Furthermore, all substances used in the compound are listed in the EU as well as the US food industry regulations.

PERTEC® UP VMQ is also characterised by very good mechanical qualities in a temperature spectrum from -60°C to +200°C. It has very good resistance to a multitude of aggressive chemicals, has very good tensile strength, and low VOC (Volatile Organic Compounds) content.

Typical Angst+Pfister products made of PERTEC® UP VMQ are O-rings, moulded parts, and membranes for drinking water applications and for uses in the pharmaceutical, medical, and chemical industries.

VOC-Value at postcuring parameter 4 h / +200°C (volatile organic compound)





## PERTEC® UP FKM

PERTEC® UP FKM is an advanced compound from this line of products. Similarly to the silicone elastomer PERTEC® UP VMQ, the purity of the material is crucial – and as such UP also stands for Ultra Pure in the compound description. This compound was developed specifically for the pharmaceutical, food processing and beverages industries. It meets all the major drinking water and food processing requirements of the relevant international regulations.

The formulation complies with the PAKs Category 1 requirements, aimed at potentially carcinogenic polycyclic aromatic hydrocarbons that must not migrate into food or beverages. The compound is known for its very good mechanical qualities in a temperature spectrum from –20 to +200 degrees Celsius. In addition, PERTEC® UP FKM is extremely resistant to aggressive chemicals and absolutely suitable for use in steam and hot water. This compound is available in a Shore A hardness of 70.

PERTEC® UP FKM is primarily produced for O-rings, moulded parts for valves, couplings, pumps for the pharmaceutical, food processing and beverages industries.



Detailed information on PERTEC®-compounds can be found on [www.angst-pfister.com](http://www.angst-pfister.com) under Downloads.



# Engineering solutions for special requirements

Sometimes the best and most cost-effective solution is not the one initially anticipated. The engineers at Angst+Pfister aim to find design approaches in dialogue with their customers that tackle multiple issues at once – and whenever possible produce a lower price solution. For example, a new silicone cover for Coperion's vibratory feeders simultaneously resulted in a more efficient cleaning cycle for their customers that minimises potentially serious hygiene risks.

The German company Coperion operates worldwide and has a manufacturing base in Switzerland. Coperion makes extruders for the plastics and food-processing industries and provides end-to-end material handling solutions. Its subsidiary, Coperion K-Tron, in turn, specialises in process feeding and pneumatic conveying. In addition to the plastics and food-processing industries these systems have applications in pharmaceutical companies. The product range includes vibratory feeders, "These feeders are designed for high-precision dosing of free-flowing dry bulk - for example, for extruders," explains Coperion engineer Urs Helfenstein.

## New solutions found together

Coperion came to Angst+Pfister for a moulding to cover a feeder drive – and already had a clear concept of what the part should look like, and provided a sketch for the part. It had to be silicone and attached on the underside by means of a metal plate to provide a tight seal. The walls of the silicone cover needed to be transparent or at least semi-transparent – and therefore thin. The serial number and construction year plate had to be easy to read through the silicone so that during servicing the cover would not have to be removed and replaced in a time-intensive procedure. In general, the thicker

the silicone the milkier it becomes. In other words, the walls could not exceed about two millimetres in thickness. A further function of the integrated metal plate was to stop the thin protective cover from slipping off, or shaking like jelly, when the dry bulk is moved forwards by means of vibration. The design for the silicone part involved two of Angst+Pfister's specialities: sealing technology and antivibration technology.

This was a hard nut to crack for Angst+Pfister's engineers: the complex structure, a length over fifty centimetres, the specification for transparency and the United States Food and Drug Administration special approval requirement. "The thing that really caused us a headache during the feasibility study was the integrated metal plate and the rubber-metal connection," says Marcello Gisler, Product Application Engineer for Angst+Pfister's Sealing Technology department. He knew solutions could be found for all the other issues. In fact, it is virtually impossible to find a manufacturer for such a large and complex silicone moulding. It requires massive tools and the right sort of machinery. "But we found what we were looking for in our vast network of first-class contacts," continues Marcello Gisler. The moulding not only had to be large but also of exceptional quality. Firstly, it could not have any tiny air bubbles



The white silicone cover on the feeder protects the electronics – without interfering with the vibrations conveying the dry bulk.

that might diminish transparency. Secondly, the surface had to fulfil strict hygiene specifications. The cover also needed to protect from dirt and spills so the equipment could be cleaned correctly.

"From our point of view, the challenge was to design a vibrating machine with as little damping as possible that prevented a build-up of dirt and could be cleaned easily," recalls Urs Helfenstein.



## Alternatives that pay-off

“Our idea was to lose the metal plate – for reasons of cost and ease of manufacture. Instead, the cover could be fixed to the metal sheet underneath by means of silicone plugs. At the same time we proposed a silicone that is so transparent that the plate underneath could still be read regardless of the thick walls,” says Tugba Bilgic Tune, Engineer Sealing Technology at Angst+Pfister. In turn, the customer carried out a vibration simulation on this design and positioned the silicone plugs – with good results and the metal insert component really could be omitted.

The engineers chose a translucent silicone rubber (VMQ) for this design with a Shore A Hardness of 50. It has FDA approval in accordance with Title 21 CFR (Code of Federal Regulations) 177.266 a) to f) for elastomer articles. This means it is included on a positive list and has passed migration testing. This material with its superior transparency ena-

bled Marcello Gisler and Tugba Bilgic Tune to increase the silicone wall thickness and dispense with the metal plate.

Coperion tested the design first with a prototype produced using the vacuum casting process. The customer gave the go-ahead for the idea – without the metal plate, the cover could be made at a significant cost reduction. “We are very happy with the outcome,” says Urs Helfenstein. The dialogue-based approach produced good, workable solutions.

## Design and hygiene regulations

Tugba Bilgic Tune und Marcello Gisler even came up with a convincing solution for the hygiene and cleaning issue in the design. “The cover was pressed onto the feeder under tension so that the internal electronics remained hermetically sealed,” reveals Tugba Bilgic Tune. As a result, a closed system was created. The silicone cover prevents ingress of dirt to the grooves. This keeps cleaning to a minimum. Coperion verified with tests

that no liquids entered the equipment and, as such, that it complies with the strict hygiene design stipulations of the food and pharmaceutical industry. “The cover envelopes the whole drive mechanism without gaps or cracks,” observes Urs Helfenstein. For customers, this means a more efficient cleaning cycle and the hygiene risk, which can have serious consequences, is minimised. “Coperion and Angst+Pfister are both members of EHEDG and have the required expertise for hygiene applications,” says Marcello Gisler. EHEDG is a European trade association that promotes hygiene in the food processing industry.”

Ultimately, Angst+Pfister was able to supply the three-dimensional silicone cover between 30 and 54 centimetres in size. “We are delighted by the good and cost-efficient solution to the challenge we faced.” – concludes Urs Helfenstein.



«The cover was pressed onto the feeder under tension so that the internal electronics remained hermetically sealed.»

Tugba Bilgic Tune, Engineer Sealing Technology, Angst+Pfister Group



«Coperion and Angst+Pfister are both members of EHEDG and have the required expertise for hygiene applications.»

Marcello Gisler, Product Application Engineer Sealing Technology, Angst+Pfister Group



# The global oil and gas industry relies on one network

MCM has been part of the Angst+Pfister group since 2019 – and had worked with Angst+Pfister in close partnership for many years previously. The networking strategy in combination with the companies' joint experience has yielded positive results around the globe – always to the benefit of mutual customers. The network is well positioned in the chemical, oil and gas industries – attributable to an extensive, high-quality range of products, materials that are always available and certified, along with a sophisticated logistics system and unparalleled service offering.

“Our network leverages the expertise of three companies for customers worldwide,” says Paola Ghirardelli, Sales Manager at MCM SpA in Italy. The company has been part of the Angst+Pfister concern since 2019 – along with its associate company O.L. Seals of Denmark. Both companies already had a successful collaborative business relationship with Angst+Pfister going back many years. The aim of the merger was to unite the expertise of all three companies in high-performance seals in order to expand the customer base and seals portfolio.

## **Elastomer and PTFE products**

MCM uses high-performance elastomers to manufacture challenging sealing solutions such as O-rings, delta rings and moulded seals in diameters ranging from a few millimetres to two metres – in low volume to high volume production, and is involved from development of the material to the finished product and beyond to material certification and project validation. This is what brought the company to the fore in Europe. It currently supplies prestigious customers worldwide in the chemical, automobile, space, pharmaceutical and food processing industries. “We have carried out multiple successful projects for the chemical, oil and gas industries, for example, for manufacturers of valves, pumps and compressors,” says Paola Ghirardelli pleased. In the Angst+Pfister logistics alliance, MCM is an increasingly sought-after partner for customers in Asia and USA.







The visual inspection of an O-ring under the microscope at MCM in Italy.



MCM supplies numerous companies such as Perar, a leading manufacturer of ball valves.

In addition to the high-performance fluoroelastomers (FKM), hydrogenated nitrile rubber (HNBR) and elastomers based on Aflas (FEPM) are deployed by customers worldwide. They offer exceptional resistance to aggressive media and chemicals such as sour gas, amines, methanol and aromatic hydrocarbons. In addition, they can be utilised in applications in a very wide-range of temperatures – from minus 60 degrees to plus 340 degrees Celsius. They are also exceptionally stable in hot water and steam.

Another area of focus is polytetrafluoroethylene components (PTFE) – produced in cooperation with O.L. Seals and its technical support in design and development. For example, back-up rings or spring-energised

seals can also be integrated in a wide range of applications: in extreme temperatures or aggressive environments such as offshore, high-pressure, cryogenic or energy systems. The PTFE seals meet the highest of safety and performance specifications required by international organisations.

#### Benefits for the petrochemical industry worldwide

Numerous materials have been developed for the oil and gas sector. “Networking with Angst+Pfister and O.L. Seals, we are excellently placed for these industries. Consequently, we can often claim pole position in the European markets and beyond,” explains Paola Ghirardelli. The networking stra-

tegy allows MCM to react to customer requirements both flexibly and with efficient logistics. A fully automated smart warehouse in Italy supports operations. This is where thousands of seals in many sizes are always in stock and ready to ship. “We often deliver within 24 hours,” says Paola Ghirardelli, not without pride. Demand is high in the petrochemical market. MCM can react quickly because many of its materials have already undergone testing for numerous applications and have the necessary certifications.

#### Successful together – for our customers

A good example of how the network benefits customers is a recent order for an international company – a global leading manufacturer of industrial valves, flow control solutions. “In 2020, we contributed to the company completing the largest customer delivery in its history,” says Paola Ghirardelli with delight. These are customer success stories appreciated by MCM in Italy. “It’s made possible by years of development in new materials. In this project, we used an HNBR 90 AED O-ring with cord thickness 10.82 millimetres – the only one on the market with NORSOK M710 approval. We also supply articles with API6A or Saudi Aramco certification.” In addition, success like this requires high-quality service, investment in warehousing logistics and a strategic network. In real terms, MCM buys high volumes of products annually and makes them available to its customers for easy purchase.

“This system will mean that in the future we will also be providing customers with innovative solutions in PTFE components,” says Paola Ghirardelli happily. This is the way forward – customers and networks growing together.



«We have carried out multiple successful projects for the chemical, oil and gas industries, for example, for manufacturers of valves, pumps and compressors.»

Paola Ghirardelli, Sales Manager, MCM

#### Project example FKM – HNBR – FEPM in cord 90 and 98

- Approval in accordance with Explosive Decompression (ED): NORSOK M-710, O-ring with cord 10.82 mm
- Special peroxide polymer GF, approval in accordance with Saudi Aramco 06-SAMSS-001, 2013-2017, O-ring with cord 10.82 mm
- Approvals in accordance with sour gas resistance (H<sub>2</sub>S): NOR SOK M-710 ISO 23936-2, NACE TMO187 and API 6A 10% H<sub>2</sub>S FFHH
- Longer service life: Life Prediction and AED test – Arrhenius ISO 23936-2, ITN84700/A
- Shell MESC SPE 85/301

# Angst+Pfister Voices



**Christelle Deloge**

Sales Application Engineer  
Angst+Pfister France

«I was used to working for family companies and I appreciate finding the same approach with a great team spirit, and a company slogan “you will never walk alone” that is particularly true.»

Christelle joined Angst+Pfister in November 2018 as Sales Application Engineer for the West of France. She worked in the plastic industry for 15 years as a Key Account Manager for a family company that produces blow moulded and injected plastic parts for Medical, Defense and Construction machinery sectors. Today, she is responsible for a wide range of customers like Dosatron (pumps producer), SDMO (gensets producer), Satys (producer of railway parts) and some others in the Agriculture sector.

Working for Angst+Pfister is my first experience in an international group. I was used to work in family companies and I appreciated to find the same state of mind with a good team spirit. The Angst+Pfister slogan “you will never walk alone” is particularly true. I have all the support I need to fulfill my job, from the French team but also from Zurich with the great technical support of Group Engineering. A lot of my customers recognize that the technical support we give them really makes the difference. Angst+Pfister also gives me the opportunity to improve my technical knowledge and also my English level with regular sessions. With the present situation with Covid-19, Angst+Pfister is there for us since the beginning and provided us all the necessary to protect us and our families, this is not the case in most of others companies and it is really appreciated.



**Gabriella Statello**

Receptionist  
Angst+Pfister Switzerland

«I love the challenge of my work. Be it a call from challenging customers, for whom I am often the first contact person, or working with the apprentices.»

After more than seven years as a flight attendant at Swiss International Airlines, Gabriella has been a receptionist at Angst+Pfister since 2014. Here she is responsible for processing and forwarding orders and customer enquiries. Together with her team, Gabriella also supervises the in-house mailroom and ensures that all letters and parcels – arriving or departing – are sent smoothly. This close cooperation within the team, its spirit and the fact that it is a crucial part of the company are among the things Gabriella has come to appreciate most. Her work as a receptionist also includes managing the meeting rooms, looking after guests and training new apprentices. Gabriella particularly enjoys working with the apprentices – a work that keeps her young and dynamic.

“I love the challenge of my work. Be it a call from challenging customers, for whom I am often the first contact person, or working with the apprentices. I never lose my composure, but try to greet every employee with a smile and a friendly word. In this way I try to contribute my share to the success of Angst+Pfister.”



«When you are surrounded by great people leading our Angst+Pfister family to everyday success, who are ready to support you even in the most difficult matters: "you will never walk alone".»



**Tomasz Żmuda**

Internal Sales Leader  
Angst+Pfister Poland

Before he joined Angst+Pfister in 2015 he has worked in a manager position at Atlantic Squash & Fitness Sp. z o.o. for 7 years where he learned how to effectively manage people and company processes. At Angst+Pfister Tomasz took up the function as Internal Sales Agent and in 2018 he took over the Internal Sales Lead. In this position he leads the Polish Internal Sales team and supports them in their daily work. He manages Polish key customer offers and orders, doing his best to provide the highest level of customer service and to cultivate very good relationships. "I like everyday challenges, because they give me a motivation for constant development of my skills. I have

the best team as every single one of them is customer oriented, openminded and ambitious contributing as much as possible to our Angst+Pfister journey to make it a never-ending adventure. But the best motivation for me is when at the end of the day the customer says "thank you for finding a solution for my problem and for the professional support". I enjoy being in this great international environment very much, where I can learn new things every day to develop myself and my team. Working in a company which puts a lot of effort to provide continuous training for each employee is a great chance for all of us for permanent development.



**Fabian Heim**

Regional Sales Leader  
Angst+Pfister Germany

«Recognize, grasp and implement the opportunities that arise.»

With a background in working for stationary and mobile hydraulic customers, Fabian joined Angst+Pfister in 2016 as a Sales Application Engineer for Angst+Pfister Germany. In 2018 he then became Regional Sales Leader, taking over responsibility for the south-west region, a position where he is able to create new business with new customers and expand growth with already based customers. He supports assigned Sales Application Engineers in order to increase customers as well as revenue growth.

Fabian appreciates the possibility of being close to different markets and receiving lots of information, which opens up different points of views and perspectives and allows to find the best possible solution for the customers of Angst+Pfister. He greatly enjoys being responsible for a sales team and trying to create a strong growing region together. "The corona crisis was a damper, of course. But every crisis brings the possibility to recognize, grasp and implement the opportunities that arise with the aim of consolidating the current jobs and creating new jobs in spite of impasses in order to further expand a great team."



**Kenny Qi**

Product Application Engineer  
Sealing Technology Angst+Pfister China

«The important thing is to develop new and improved solutions for our customers.»

With various experiences in sealing engineering, Kenny joined Angst+Pfister in 2014 as a Product Application Engineer in Sealing Technology, providing technical assistance to customers, supporting the sales team and offering engineering solutions for the specific requests of the customers. In his position Kenny has furthermore the possibility to develop new markets or applications to expand the product and customer portfolio. Kenny especially appreciates the chance and challenge of building a comprehensive team of highly qualified application engineers, who have amassed expertise across a broad range of industries.

"To me it is not just a matter of replacing defective seals or gaskets. The important thing is to develop new and improved solutions for our customers. As an engineer, I am glad to share the experience and can do approach to offer solutions to customers' unique needs."

# 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 products on [www.angst-pfister.com](http://www.angst-pfister.com) – or a visit to the online shop [www.apsoparts.com](http://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.



## PERTEC® CIP FKM



Angst+Pfister is expanding its O-ring stock range with the new high-performance elastomer PERTEC® CIP FKM 75.501-04. This material was developed exclusively for sealing solutions in the food sector, has the appropriate approvals and complies with PAK Category 1. It goes without saying that it is highly resistant to CIP media, as well as hot water and steam. Due to the special polymer structure, this material also has a comparatively low friction factor and is therefore also used in dynamic applications. We currently have around 200 of the most common dimensions in stock and will continue to expand our stock range.



## 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.





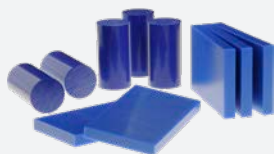
**APSOvib® Conical bearings**



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.



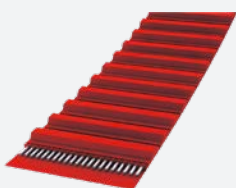
**APSOfluid® TETRAFLEX® S PTFE hose lines**



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 customers' 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.



**SYNCHROFLEX® GEN III**



The combination of high-strength steel cord tension members and abrasion-resistant polyurethane makes the SYNCHROFLEX® GEN III polyurethane timing belt dimensionally stable and particularly durable. The power transmission of the new GEN III increased by nearly 25 % in comparison to the standard version of SYNCHROFLEX®.

The high performance polyurethane used achieves considerably higher benchmark results and the increased hardness of the polyurethane allows a higher number of load-bearing teeth. Thanks to the use of a bifilar tension member arrangement and a higher packing density, SYNCHROFLEX® GEN III timing belts provide the best possible solution for any product, down to the smallest detail.



**APSOvib® Hinged foot**



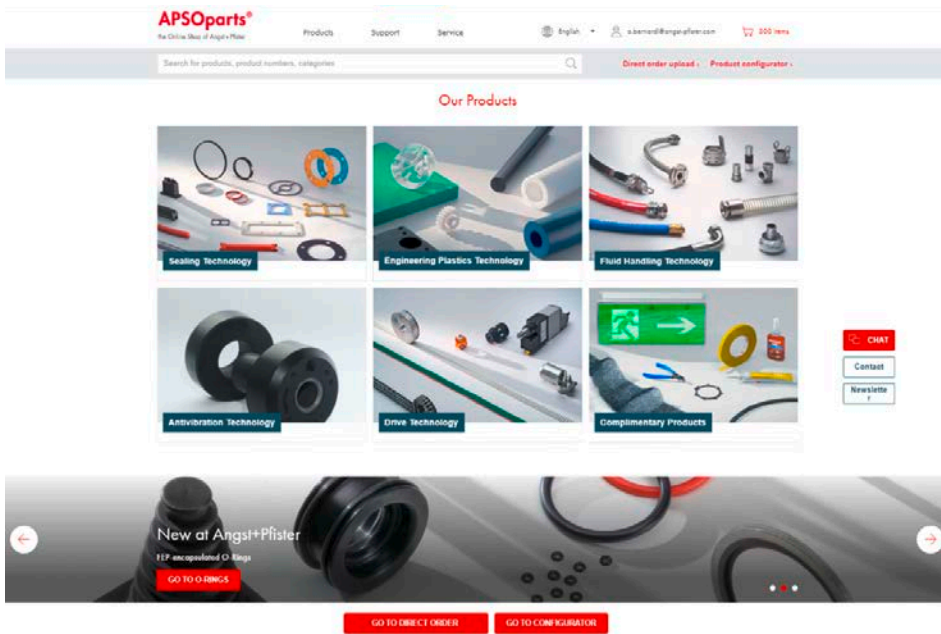
APSOvib® Hinged feet with glass fiber reinforced polyamide are available from stock with the diameters 40, 50, 65, 83, 103 and 123 mm. They are suitable as leveling machine mounts thanks to their high load capacity and the possibility to be oriented +/- 15°. They also have a high corrosion resistance.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



# New look, new features

The new style APSOparts with additional functions will be impressive. However, the features that made the online shop such a success in the first place will stay the same: the leading range of superior components coupled with the efficient back office – and on request, the expertise of the Angst+Pfister engineers.



Angst+Pfister has been selling a standard range of over 100,000 products from its own standalone shop APSOparts for about twelve years – in the digital world that counts as more than one lifetime. Over 17,000 customers worldwide value the simple and efficient logistics with round-the-clock ordering, attractive terms as well as the configurator tool for an easy cut-to-size order option for components.

“Nowadays, online channels are run alongside classic direct sales in most industries and expand the customer approach. The successful operations are those that offer a standalone, user-friendly and functional alternative,” says Rainer Senn, Head of Marketing and Customer Services of APSOparts. In order to build on established success, APSOparts undergoes a complete makeover – not only with a new design, but also an uplift of the technical features (see box). “We are really looking forward to a new era of working with our customers,” reports Rainer Senn.

## Extensive high-quality range

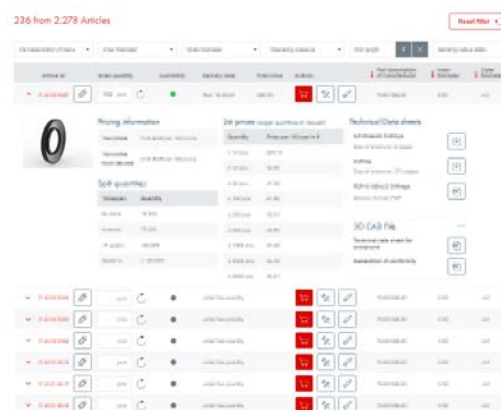
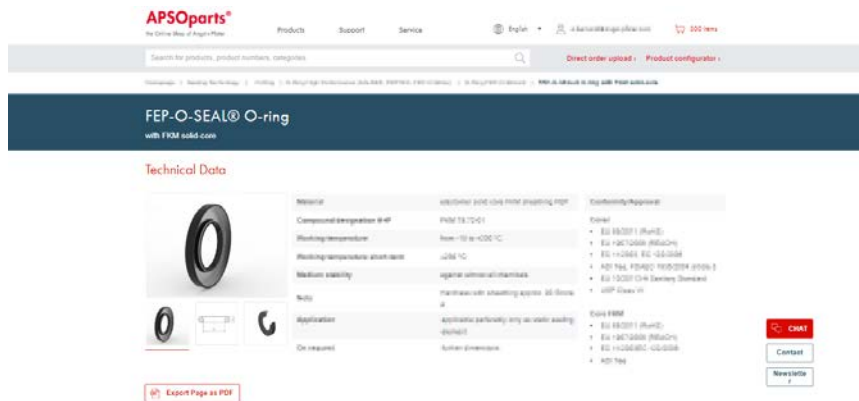
The relaunch will consolidate APSOparts' market position as a top manufacturer of semi-processed plastics. The corner stone for this continues to be efficient supply chain management. APSOparts processes annually over 100,000 orders in Embrach near Zurich,


"DirectUP" - Upload your ERP order as a PDF file  
directly to our APSOparts® online shop



Check it out now!







«Nowadays, online channels are run alongside classic direct sales in most industries and expand the customer approach.»  
 Rainer Senn, Head of Marketing and Customer Services APSOparts

Switzerland. The semi-processed goods are shipped from there to customers almost exclusively as cut-to-size orders or complete rods or plates. “Thanks to a new cut-to-size machine, in the autumn of 2021 we will be taking process efficiency to the next level,” says Rainer Senn with pleasure.

In addition to the semi-processed goods there is an exceptional range of sealing technology products on offer – in collaboration with suppliers and the in-house products. Availability and stock-levels are constantly adjusted to suit market and customer requirements. “We are in a position to react quickly and flexibly,” says Rainer Senn. This applies equally to products with or without certification. When a consultation is required regarding materials, applications or design, the project is forwarded right away to

Angst+Pfister specialists. The range is augmented with high-quality standard products for fluid, antivibration and drive technologies.

**Professional support**

The extensive range makes APSOparts a versatile and valued partner for C-parts management. Another success factor is the professional, multilingual back office that for many years has handled all sorts of customer concerns and input. “Specialist staff and quality products have been the winning formula for the success of APSOparts,” says Rainer Senn. And that is going to stay just as it is.

Customer enquiries about the new shop, products or prices can be emailed to [support@apsoparts.ch](mailto:support@apsoparts.ch).

**Key features**



1D and 2D configurator



Improved search functions



3D files download



Availability in real time



"DirectUP"



Product finder

# From March 1st, 2021: Pewatron will become Angst+Pfister Sensors and Power

Pewatron AG and its sister company, Pewatron Deutschland GmbH are serving industrial and medical customers around the world with advanced sensors, power supplies, power electronics and drive solutions. Both companies are 100 % owned by the Angst+Pfister Group since many years. This successful cooperation is to be further highlighted and even extended for the future by implementing the new brand Angst+Pfister Sensors and Power.



The sensors and power business has always been an integral part of the Angst+Pfister Group. In fact, Pewatron is serving most of the same customers as the group. At the same time the market trend to integrate electronic functions directly into the customer's application is getting more and more important.

"By introducing 'Angst+Pfister Sensors and Power' we want to demonstrate our commitment to further extend and invest into our sensors and power business as a cornerstone of Angst+Pfister's growth strategy", says Thomas Röttinger, CEO of Pewatron. In addition, the new brand will reflect the close cooperation between the Angst+Pfister developers team and the Pewatron product engineering team in the evolution of sensing solutions based on the joint know-how in both, elastomer based materials and sensors. "Sensing materials are finally becoming a reality", Röttinger explains.

In early 2021, a re-branding campaign will be kicked off to properly introduce the new brand to all customers, suppliers and other stakeholders. In parallel Sensors and Power will be integrated into the new Angst+Pfister website and is planned to be launched as well on March 1st. Apart from the new company name and mail addresses all contact data for the Sensors and Power team will remain unchanged. More information:

[www.angst-pfister.com/group/pewatron](http://www.angst-pfister.com/group/pewatron)  
[www.pewatron.com/en/company/about-us](http://www.pewatron.com/en/company/about-us)



«By introducing 'Angst+Pfister Sensors and Power' we want to demonstrate our commitment to further extend and invest into our sensor and power business as a corner stone of Angst+Pfister's growth strategy.»

Thomas Röttinger, CEO, Pewatron



# Integration of digital technology greatly simplifies the use of magnetic field sensors

In addition to the seal components, the magnetoresistive sensors from NVE also make the operation of pneumatic and electric actuators more secure.

*Smart Sensors integrated in a space-saving manner*



«The new Smart Sensors will significantly advance the projected strong growth of the IoT.»

Harald Thomas, Product Manager Pewatron GmbH

The Smart Sensor technology from NVE is a great example of how the use of magnetoresistive (MR) sensors in electric actuators can be simplified considerably through forward integration.

Electric actuators or pneumatic solutions are used in challenging yet safety-related systems as drives for linear cylinders, damper actuators, rotary drives or swivel drives. Reliability of the individual built-in components is a key priority for these applications. As the NVE Smart Sensor is an electronic product and thus sensitive to moisture, these components must be protected against dust, dirt or moisture in a housing by the right selection of seal components.

The drives move over a specified distance. The path length or the approach are detected by a sensor that is positioned either next to or along the axis (e.g. at the end point of the path). In many cases, the axis itself is already magnetised or the magnet sits at the end of the axis.

The SM228 Smart Magnetometer from NVE comes into play here. This new sensor integrates the discrete components required to convert the recorded signal into a tiny 2.5 x 2.5 mm housing. The signal is processed on site and the results are transmitted through the standard interface, e.g. transmitted to a microcontroller.

The benefits of such an integrated solution are clear. All components are coordinated for the defined work area and calibrated accordingly. The SM228 can be configured for applications according to specific parameters via the existing interface. The TMR technology used in the SM228 allows three switching characteristics.

- **Bipolar:** the sensor is switched on with a magnetic north pole and switched off with a south pole.
- **Unipolar:** a magnetic north pole is activated when the threshold value is reached and deactivated when the magnetic field falls.
- The third option offers security against external interference. The SM228 can thus be programmed to 'its threshold values and can no longer be influenced by other external interference magnetic fields (burglar protection, e.g. windows, doors).

## 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.

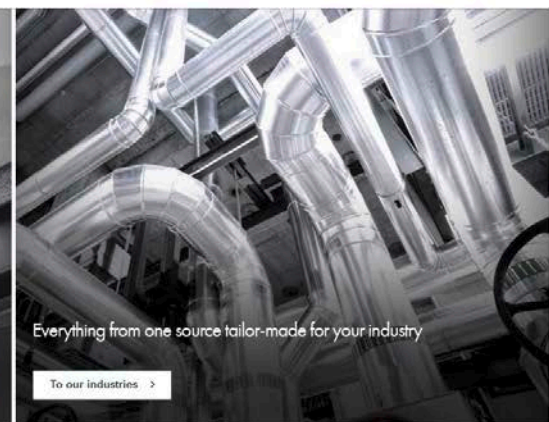
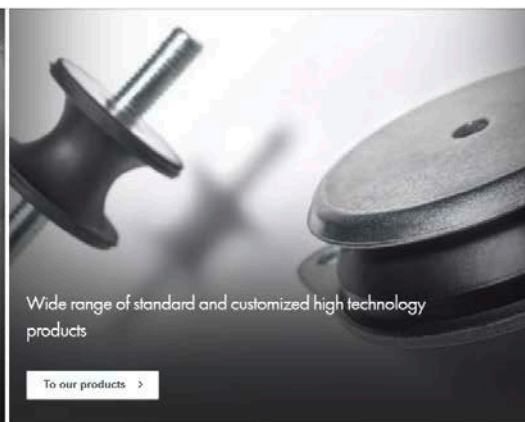
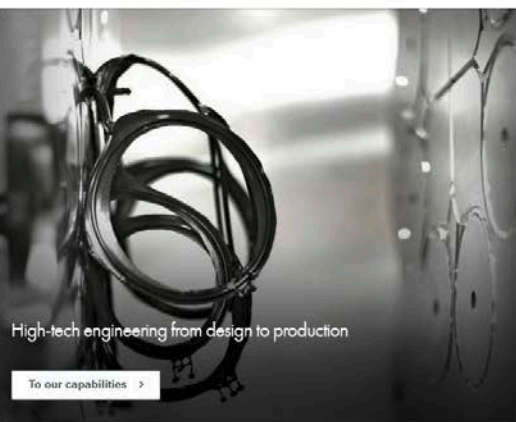
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ONLINE SHOP



Our Group is a leading developer, manufacturer and global supplier of sophisticated component and engineering solutions for more than 20'000 OEM customers in a variety of industries.



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200 engineers design and co-engineer components for our customers' projects.



15 countries with own production capabilities and worldwide supply chain partners



100 years of experience in saving time and money for our customers.

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