



Cellular rubber | Cellular polyethylene | Foamed rubber | Fluid sealants | Soft rubber | Special products | Filter technology

special

▶ **FIP(F)G engineering**

Accurate sealing directly onto the component

▶ Laser measurement
Precision control

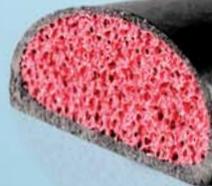
▶ **Casting technology**
A tighter seal? Impossible!

▶ **2 locations**
Services closer to you

▶ **Innovative: 2C+2C Sealing foams**
with flexible elastomer skin



FIP(F)G



FIP(F)G

formed in place foam gasket

Dear readers,

No doubt you've already read our special edition on FIP(F)G. Well here is an update to that.

Over the last few years, several new developments have come to light. Both our German and European customers are increasingly making use of our advantageous locations. The FIP(F)G manufacturing location in Aachen, which launched in 2011, is now fully up and running. We can now deliver quickly and reliably to anywhere in Germany, as well as the close by Benelux region from our locations in Bovenden near Göttingen and Aachen. We like to consider ourselves as service providers that are "close to you". As one of our customers, this means you not only take advantage of our years of experience and highly modern machinery, but also the best logistics and warehousing capacities in the sector. At a cross-sector level, an increasing number of customers are

profiting from this outsourcing model. Efficiency that pays off.

So what can you expect from this edition? We'll be showing you the technique and process, describing the advantages and properties of and, last but not least, presenting some of those who are facing the daily challenge of finding the very best (sealing) solution for you.

So let's embark upon the journey to find the right sealing concept. Thanks to our broad expertise in sealing issues, we will find the perfect solution for you in anything from FIP(F)G to foamed rubber and from cellular rubber to formed-in-place homogeneous silicones.

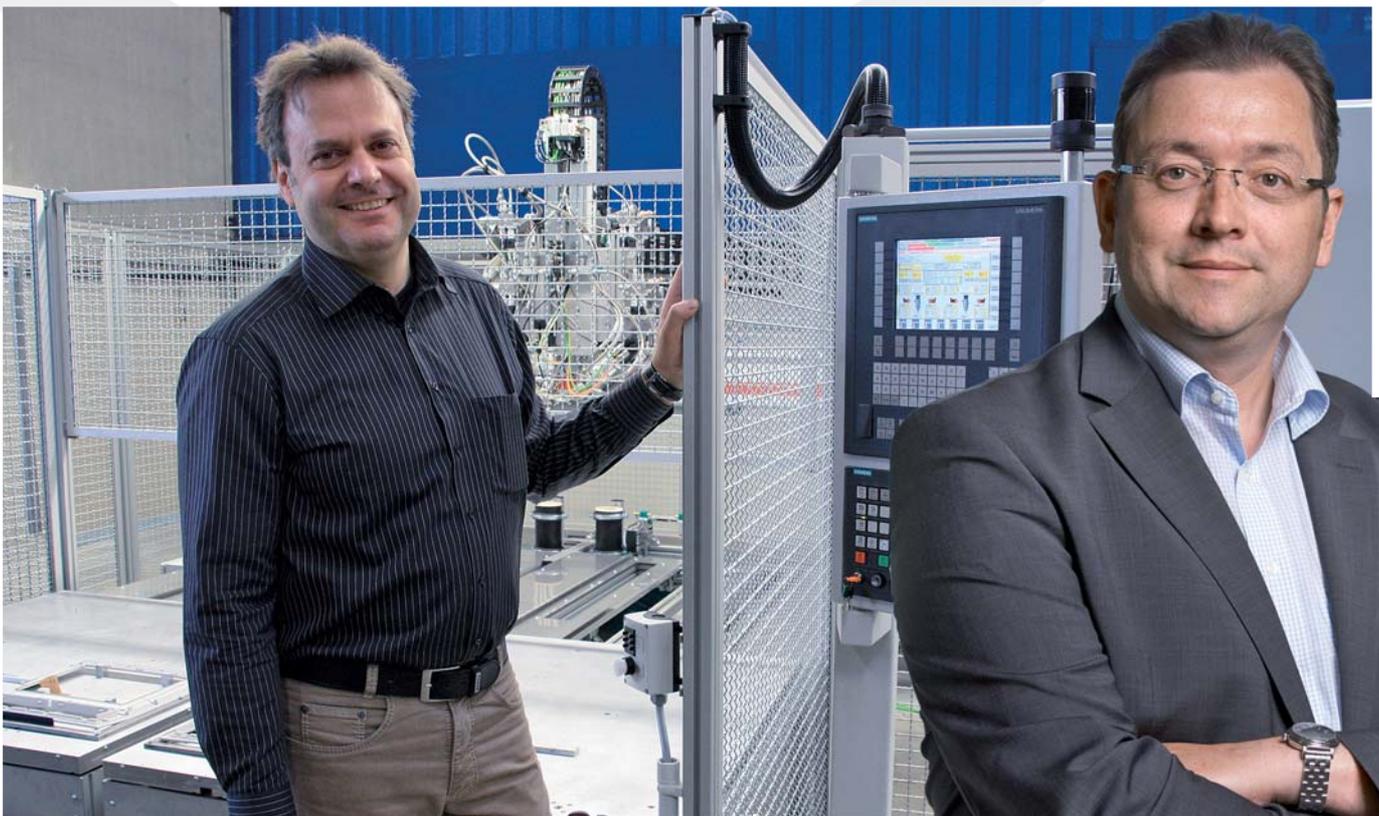
Take advantage of our one-stop know-how and competence in sealing – that's our strength. We wish you happy reading! Warmest greetings from Aachen,

Dr. Ralf Tahhan

Key Account Manager FIP(F)G

Christof Carduck

Head of Sales & Marketing



Perfect solutions are a matter of the mind

Dr. rer. nat. Ralf Tahhan

Key Account Management
1C/2C/4C FIP(F)G sealing systems,
Casting, adhesive bonding;
location: Berlin, Bovenden, Aachen

“The potentials of FIP(F)G technology are as individual and varied as the demands our customers place on the seals themselves. On-site technical consultation is indispensable in this respect. Our experience and technical competency are the key to a perfect solution. Finding this together and satisfying you as the customer is a challenge I’m always up for.”

Peter Siemer

Production Manager, FIP(F)G
location: Bovenden

“I’ve been following the success story of FIP(F)G in general and KÖPP in particular since the birth, so to speak. Seeing this technology grow over recent years and knowing that I’ve been involved in it gives me a feeling of pride. The newly added site in Aachen is the best evidence of that. And there’s something else that motivates me here... the development is by no means finished.”



Stefan Fenkart

Key Account Management
South, Polymer Service Centre of Excellence;
location: South Germany, Austria

“As an engineer, I’ve assisted in the most widely varying projects for over 25 years. The FIP(F)G technology offers my customers tailor-made solutions for the preparation, dosing, mixing and application of one, two or more component adhesives and polymer seals. In so doing, keeping tabs on all the process engineering requirements in the interaction of production flow with chemical and processing plant is a challenge. When this results in a process-reliable production concept which can be economically implemented, then I’ve done my job.”

Walter Koch

Works Manager,
Bovenden branch

“With decades of know-how in the business of FIP(F)G we are winning over a steadily growing customer base. Our highly variable and ultra-modern machinery as well as our unparalleled, comprehensive logistics capacity are reasons why customers are increasingly calling off even large annual volumes from us. Reacting to these developments with the right technical ammunition and always maintaining optimum performance for our customers requires our total experience. I’m happy to go the extra mile for that.”

Ivan Mezzofonte

FIP(F)G production manager
location: Aachen

“The opportunity to broaden my expertise in process optimisation as part of a highly-qualified team was both motivation and a challenge for me. My personal understanding of a ‘contract foam company’ is not just to apply a water-tight seal, but also to be a competent partner and service provider who offers a high-quality yet economical product to its customers.”

A Quantum of air

Perfect sealing with PUR directly on the component

solutions



in foam



KÖPP has now been providing workpiece-bonded, highly elastic, dimensionally accurate and economical seals in the form of FIP(F)G sealing systems for more than a decade now.

insight. spoke with Key Account Manager Dr. Ralf Tahhan about the work with this technology and the perpetual search for the right “quantum of air”.

Dr. Tahhan, before we talk about the advantages and singularities of the FIP(F)G technology, could you please just briefly describe how it works?

Dr. Tahhan (laughs): Briefly? I'll try... In the case of a FIP(F)G process, a one or two-component liquid (i.e. still unset) sealing system is applied along the contours

“in position” directly onto the part with the help of a robot. As a result, the reactivity of the components is adjusted according to the production process and the pouring properties is specified according to the type of part in question. So low-viscosity systems are used in more simple, two-dimensional slotting applications, whereas thixotropic

systems are used where there is no groove or in 3D applications. FIP(F)G stands for Formed-In-Place Foam Gasket, I think the name itself explains pretty well how the process works.

Is this where the search for the right “quantum of air” begins?

Dr. Tahhan: Exactly. The quality of an expanded seal depends very much, in addition to choosing the right basic components of course, on the degree of the so-called air nucleation which is specific for each material. To do this, the components A of the polyurethane (the polyol) are mixed under pressure with air (or sometimes rarely nitrogen – N₂) which then slowly begins to dissolve. Only once the process is completed can the desired seal be formed.

Why is polyurethane particularly suitable for the FIP(F)G process?

Dr. Tahhan: The polyurethane has definitely had a considerable influence on the acceptance of FIP(F)G technology. It is economical and the two components, polyol (resin, component A) and isocyanate (hardener, component B), can be mixed individually according to a specified mixing ratio using dosing equipment consisting of two pressure vessels. The mixing then occurs at the mixing head with the help of the integrated stirrer, achieving application rates as low as 0.05 g/s. The result: compact elastomers or expanded, soft-elastic products which seal perfectly. Additionally expanded seals made out of polyurethane (PUR) are excellent thanks to their mixed-cell structure:



Lighting seals for cars

open and closed cells in a specific ratio dependent on the materials. Open cells which are connected are much more able than closed systems to take in air from the atmosphere when not under pressure and therefore return much quicker to their original state. The permanent deformation, known as the compression set, is much lower with these products.

Which areas have FIP(F)G sealing systems found their way into since their development? Where most recently in particular?

Dr. Tahhan: In all kinds of different areas. They can either be used as a completely new application or they can be used as more economical substitutions in the case of existing solutions. In the case of the automobile industry, for example, they can be used in lights, door modules, air conditioning systems, water tanks and eBoxes; in cover gaskets, control devices or sensors; in different household devices and in control cabinets and in medical technologies. FIP(F)G technology is being used more every day in electromobility, electrical facilities such as solar and wind power

“Köpp offers any amount of know-how in finding the optimum sealing system.”

Dr. Ralf Tahhan, Key Account Manager

stations and in energy-saving devices such as LEDs.

Sounds like a “seal for all seasons”, doesn't it?

Dr. Tahhan: Of course I'd love that to be the case, but things aren't quite that simple. There's no such thing as an “off-the-shelf” sealing system. FIP(F)G can be found everywhere, but it's not the right solution 100% of the time. The best sealing system to be used is always a question of technical specifications and, of course, the different weather and chemical conditions where it will be used.

To make the very best decision on the right product, you need to have comprehensive expertise: and that's what we have here at KÖPP. We work together closely with our customers to find the best solution for them. You can find out more about how we do that on page 11.



Corona surface treatment – better adhesion with reversible surface transformation

Precisely controlled with laser beam

Our customers know only too well the importance of top quality, reliable seals. This is why we make every effort to implement our customers' quality specifications precisely.

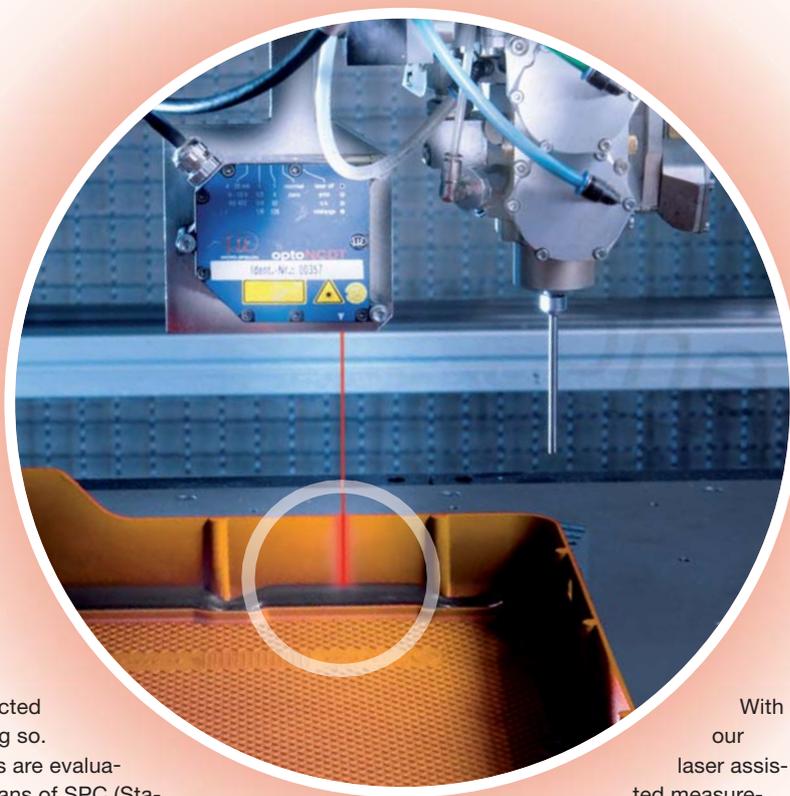
For the FIP(F)G technology this means that in the case of reactive materials on the machine side we check – even several times in one shift – the material throughput and mix ratio of the components respectively as well as the foam quality on reference specimens or directly on the component itself. On top of that, some years ago we developed a laser assisted measuring process in conjunction with a renowned measuring equipment manufacturer which is setting benchmarks in the sector.

With this method, we examine the seal height precisely while the production process is running by selecting pre-defined measuring points which are delineated and checked by the measuring unit. The position and number of measuring points can be

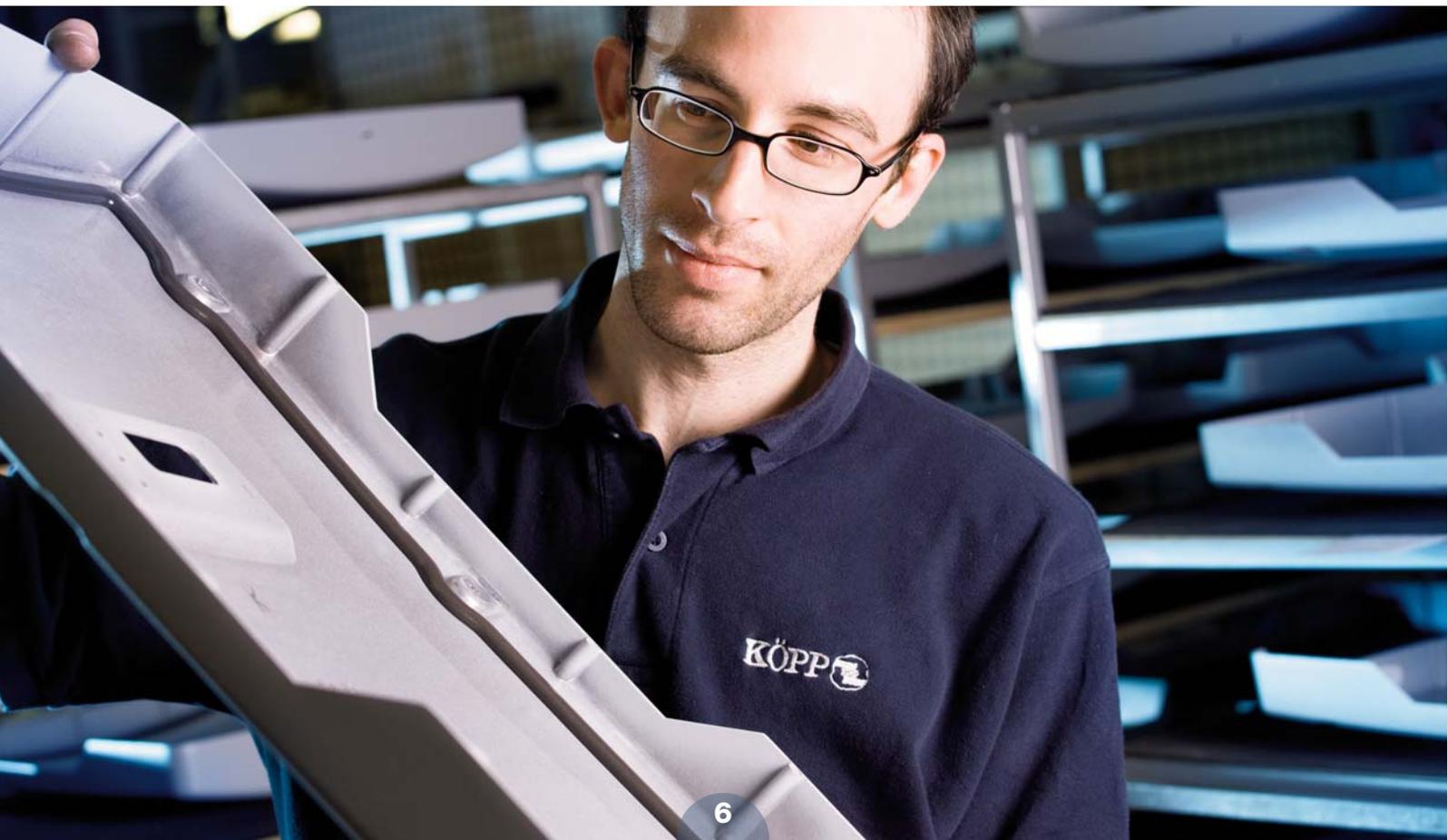
freely selected while doing so. The results are evaluated by means of SPC (Statistic Process Control) and are transmitted to our customer's quality control if required – in real-time, so to say. The process capability can thus be illustrated transparently at any time.

Perfectly dosed and dimensionally checked to laser precision. That, for me, is the difference between a good solution and a perfect one."

Dr. Ralf Tahhan, Key Account Manager



With our laser assisted measurement we guarantee our customers that their seal always exhibits the specified and inspected foam height – and with it a compression path which is crucial for the specific function of each seal. Key Account Manager Dr. Tahhan is convinced of the advantages of the laser measurement: "Perfectly dosed and dimensionally checked to laser precision. That, for me, is the difference between a good solution and a perfect one. And our claim is nothing less."



FIPG

Most precise dosing EMC systems Optical measuring

- Most precise dosing up to 0.5 mm
- Use of EMC systems

• Contactless, optical size measurements, even in transparent systems. These are just a few of the key features of our glue, sealing and casting applications out of 1-component materials – the perfect complement to our multi-component sealing systems. KÖPP has for some time now been working on these fine dosing systems. The high demand for applications in so-called EMC systems in the medicine, hybrid and electronics sector has proven we were right. As we have shown you before, the system is also capable of measuring the product thickness, even in the case of transparent seals. Dosing robots are used which integrate the dosing head into the steering system and so can apply a very accurate volume of product independently of the dosing volume or viscosity of the materials. “Our 1C dosing systems are capable of applying sealing widths all the way down to 0.5 mm thick perfectly”. However they can also be used in triangular profiles with a temperature stability of up to 250°C with the same system.



“Our customers know they’re always in good hands, even in the joining process”, says Dr. rer. nat. Ralf Tahhan. “The design of the component itself can even sometimes be made more advantageous. And we can help give our customers the best advice and support”. You always need to remember: the overall process must work as smoothly as possible.

A tighter seal? Impossible! Casting technology: unbeatable resistance

Over the last couple of years, casting technology has been used more and more to protect and seal certain components. High-quality casting systems protect from dirt, humidity and vibration, can hide sensitive customer expertise and can stop everything but optical signals from leaving the component. An increase in mass can also make the component appear more valuable.



KÖPP works with both single and multi-component materials systems such as those based on polyurethane, epoxy or silicone.

Highly-modern dosing systems cast complex electronic components or also just simple applications from different sectors with the help of single or dual component products. KÖPP also uses its comprehensive machinery for FIP(F)G technology, which can be used in a “downwardly compatible” manner. If you know how to expand, then you also know how to cast and glue. For example, we can apply a thixotropic sealant around a circuit board as a first step. The area enclosed by the sealant can then be filled with the correct material. This technology is known as the “dam and fill” process.

The right material is decisive

The technical requirements of a component depend ultimately on the choice of materials. Thanks to KÖPP’s growing and verifiably wide expertise, our customers can be sure they’re getting far-sighted advice.

What stress and temperature-specific load is the component exposed to? Does it have a weight limit? Should the use of slow-hardening or gel-like casting systems be considered? What are the possibilities of reactions with the surrounding air humidity? Is it possible to also use isolated, manual dosing or must the dosing be carried out by specific programming of the CNC unit as a result of the component’s geometry and/or possible air pockets?

These are just a few of the questions KÖPP will go through in detail with its customers. We will seek out any and all solutions in casting technology. Thanks to KÖPP’s extremely wide range of materials systems, we can discuss the perfect concept for you and find you the optimum solution for your requirements.



Bovenden site



View of the production hall, Industriestraße 9, Bovenden

Ideally positioned in Germany for Europe



The Bovenden branch in the heart of Germany has always been KÖPP's site for FIP(F)G technology as well as our foamed rubber production. Some 100 employees work here in a three-shift operation on the 1,400 m² production floor and 1,500 m² of warehousing. The recent generous extension to the warehousing capacity is not only in line with current demand, it also gives KÖPP future sustainability as the need for storage space constantly expands. "And this development is far from over. Now, we're ideally prepared for it." says Works Manager Walter Koch.

6-axes dosing plant
for complex seal contours





Innovation at the Aachen site: 4C plant from Rampf

Closer to our customers

As we already explained in our first edition of insight.special, it was always KÖPP's intention to satisfy the growing acceptance and therefore demand for FIP(F)G systems by expanding to yet another location in Germany. And that location could only really be Aachen. Just as Bovenden provides service from the heart of Germany to the whole country, Aachen can provide service to where Germany, the Netherlands and Belgium come together – our European neighbours in the Benelux region and France will now enjoy enormous logistical advantages thanks to this local access.

The new location will also help the most important information exchange with our technical departments in construction and development without the need for long journeys. And we intend to make good use of that: we have already been able to convince a considerable number of customers from neighbouring areas to optimise their products with the help of FIP(F)G seals.

We have received requests for information from LED, electronics and solar producers, as well as very modern hybrid technology producers, who will be able to make much better use of this proximity to reduce their logistics costs.

We have seen particular interest from customers from the Netherlands who have been very quick to use this “on-site” exchange intensively. “Sometimes that means we have to be quite spontaneous” winks Dr. Tahhan. “But that’s what’s so great about it as we can see how our concept is on the rise”.

Customers are increasingly outsourcing

“One thing is clear: customers are resorting strongly to the outsourcing model with the application of seals”, adds Key Account Manager Dr. Ralf Tahhan. “That’s because in KÖPP they’re finding a specialised service provider who brings with them a know-how – built up over years – of the most diverse

Customers are resorting strongly to the outsourcing model with the application of seals.”

Dr. Ralf Tahhan, Key Account Manager

materials and can react to the necessary adaptations at short notice.” This has demonstrated itself over the past years to the extent that this service is not only being used by customers with smaller to medium-sized runs. The market segment whose quantities would normally anticipate investment in their own plant will today also be catered for by KÖPP. Series in the order of a few 100,000 components per year are ever more frequently provided with seals from KÖPP. “Our customers are saved – in the truest sense of the word – the not inconsiderable investments and the not to be underestimated complexity of mastering the process”, adds Tahhan.



Innovation



The most modern programming and control electronics for perfect dosing results

2C+2C=4C



Sealing foams with flexible elastomer skin

To be precise, this is a 2C + 2C dosing system which adds a hard-wearing, flexible elastomer skin as required to a 2C PU sealing foam via a special co-axial arrangement of two mixing and dosing heads. The advantage: Foam core and outer skin can be individually combined and matched to the application in terms of softness and density. This results in many options for adjusting the material to the required properties – such as hardness, water absorption and chemical resistance or high-level mechanical requirements such as tear strength or abrasion resistance.

In agreement with the material suppliers, “intelligent” additives such as bonding agents or UV stabilisers etc. can be incorporated only where they're really needed – namely in the elastic sheath.

KÖPP concertedly develops its FIP(F)G expertise.

For demand continues to grow. To be able to even better satisfy individual and custom fitted solutions, KÖPP has now, in addition to the dosing robots for one or two-component sealing systems, acquired a 4C plant for the Aachen site.



Core-sheath seal

The internal cell structure thereby remains fundamentally uninfluenced by such measures and continues to provide for the softness of the seal. At the same time, specific finishes are more economical.

By virtue of the modular configuration of the dosing plant, the production of the classic polyurethane seal and the application of casting and adhesive systems in established grades remains possible.

The combination of soft core and elastic skin is a valuable extension to the FIP(F)G technology, the success and versatile application of which KÖPP will be further promoting.

ADVANTAGES:

- Extreme tear strength
- High chemical resistance: adjustable to alkalis, acids, among others
- Adjustable UV resistance
- Extremely low water absorption
- Improved gas-tightness
- Adjustable antistatic properties
- Price advantage over pure elastomer seals
- Outer skin and inner foam can be separately adapted to requirements

Question:

Are your lips still quite sealed?



Only joking, of course.

You see, we would like to urge you to make a critical reappraisal of your sealing solutions.

Could FIP(F)G be something for you? Or are your requirements always a case of seals from our versatile cellular rubber grades or for the “classic” foam rubber seal?

The latter, incidentally, is all too often underestimated. Although foamed rubber can be compelling by virtue of the widest range of recipe variants in terms of chemical and thermal resistance and, depending on application, it can be deployed just as polyurethane (FIP(F)G) or silicon (FIPG) which are freely applied directly on the component.

Our strength is in holding fully open and constructive discussions with the customer on the advantages and disadvantages of all sealing variations. Only the fewest companies can offer this advantage of being able to select freely from the most diverse processes, concepts and materials: everything from a single source. With us, it's routine.

Which is why we ask: Are you sure you've already found the optimum solution?

We'd be delighted to collaborate in putting your current sealing systems to the test. Benefit from our know-how and save time and money with the right solution, right from the start.

By the way (note to self), foamed rubber as a high performance seal is the topic of the next issue of **Insight**.

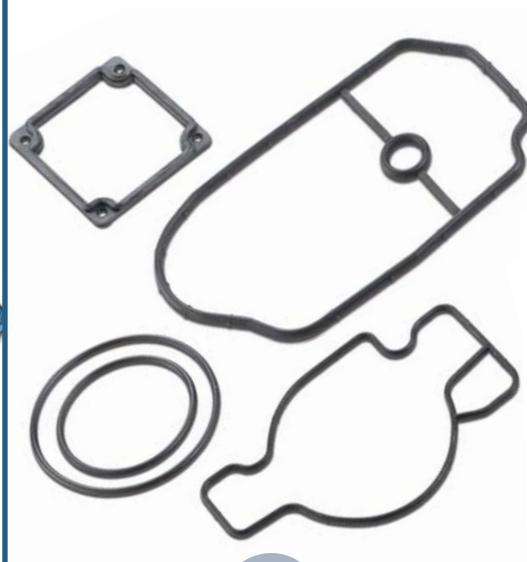
FIP(F)G

Freely applied sealing bead



Foamed rubber

Moulded foam rubber seals



Cellular rubber

Die-cut seals



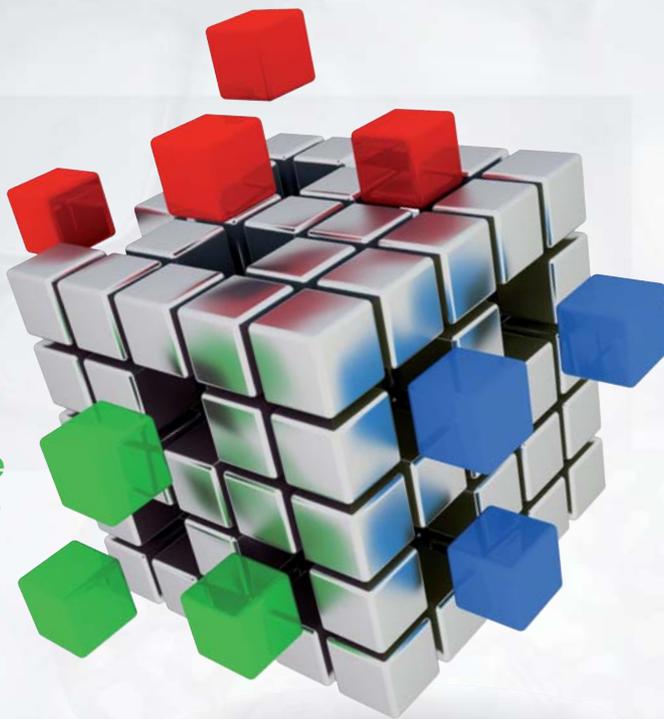
Sealing | Insulating | Isolating | Filtering ...

Competencies

■ distributor ■ manufacturer ■ processor ■ service provider

Materials

- Cellular rubber
- Cell polyethylene
- Sponge rubber
- Solid rubber
- 1K/2K/4K liquid seals
- Vyon®/Guron®



Expertise

- Development
- Advice
- Manufacture
- Processing
- Application
- Distribution

SOLUTIONS IN FOAM®



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