



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

# special

▶ **FIP(F)G engineering**

Accurate sealing directly on the component

▶ Laser measurement  
**Precision control**

▶ Site expansion  
**Ideally positioned for Europe**

▶ **Innovative: 2C+2C**

**Sealing foams**  
with flexible elastomer skin



# FIP(F)G

perfection for us  
is a question of form



Dear readers,

You've known our magazine **insight.** for a few issues now. Today, for the first time, we've brought out a special edition – one devoted exclusively to the subject of FIP(F)G. And with good reason, we think, as we have established that this topic has red hot relevancy – and not only for ourselves since we expanded our Aachen production capacity and introduced the new 2C+2C technology there – but for our customers too, whether in Germany or Europe, FIP(F)G sealing systems are ever more frequently becoming the ideal solution. In this respect they not only have resort to our long-standing experience but also to our ultra-modern machinery and not least to comprehensive logistic and warehousing capacity. Ever more customers are using the outsourcing model, thus remaining flexible in order to be able to react promptly to constantly changing and growing demands.

**Dr. Ralf Tahhan**

Key Account Manager FIP(F)G

What awaits you in this edition? We'll show you the technique and the process, describe the advantages and properties and, not least, we'll be introducing some faces to you who rise to the challenge on a daily basis to find the best possible (sealing) solution for you.

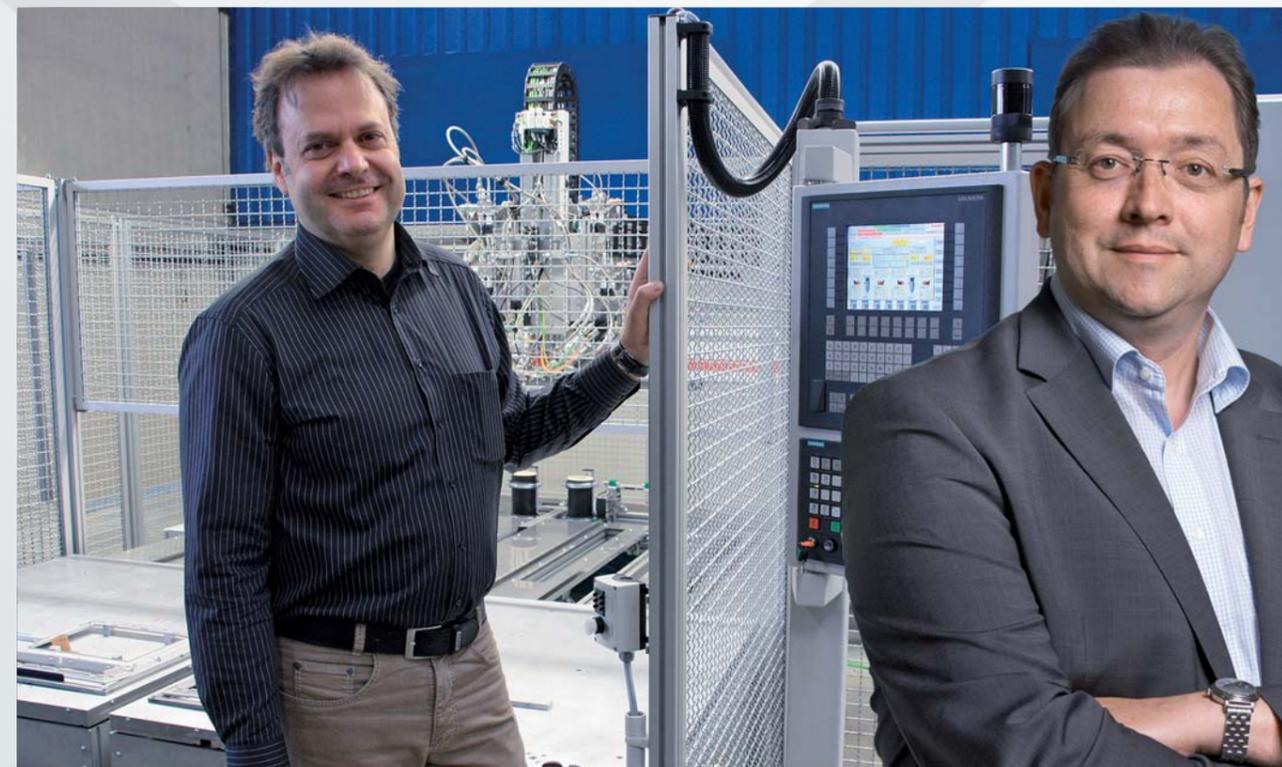
Join with us in the search for the right sealing concept. Our holistic expertise in sealing problems also enables us to find a suitable cross-concept solution: from FIP(F)G to foamed rubber, from cellular rubber to freely applied homogeneous silicones and beyond. Reap the benefit of our know-how and profit from our one-stop sealing expertise. For that is precisely our strength.

Enjoy the read...

Warmest greetings form Aachen,

**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, Aachen

*"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."*

**Roger Devine**

Production Assistant  
FIP(F)G;  
Location: Aachen

*"The opening of the FIP(F)G facility in Aachen brought with it a new challenge for me at KÖPP in that I could integrate my programming knowledge and my previous experience as a REFA technician beautifully. I'm inspired by the variety of possibilities this technology brings with it and I'm convinced the high level of potential for innovation is by no means exhausted. This has promise for the future – and for my personal development, too."*

# A Quantum of air



systems are rather used in three-dimensional applications. FIP(F)G in fact stands for Formed In Place Foam Gasket which is a fairly apt description of what happens.

*Is this where the search for the right "quantum of air" begins?*

**Dr. Tahhan:** Exactly. The quality of a foamed seal is essentially determined, apart from a suitably selected base component, by the degree of so-called air charging which is specific to each material. In this regard, for the most part, the A component of the polyurethane, the polyol, is loaded under pressure with air (rarely with nitrogen N<sub>2</sub>) which then gradually begins to dissolve itself in this. The desired seal cannot develop until this process is completed.

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

**Dr. Tahhan:** Polyurethane has contributed fundamentally to the acceptance of the FIP(F)G technology. It's economical and both its components – polyol (resin, the A component) and isocyanate (hardener, the B component) – can be individually mixed via a dosing plant from two pressurised vessels to a specified mix ratio. The mixing then takes place in the mixing head by means of an integrated agitator. Output capacities right down to 0.02 g/sec. can be achieved. The result is compact elastomers: foamed, soft elastic seals with perfect sealing functionality. Over and above this, the mixed cellular structure of polyurethane (PUR) seals is impressive: open and closed



Lighting seals for cars

cells exist simultaneously in one specific, material-dependant ratio. Open cells which are linked together can, in contrast to closed systems, return to their initial state more quickly due to their ability to suck in the surrounding air. The remaining deformation, the so-called compression set, is less in this case.

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

**Dr. Tahhan:** In the most diverse areas. They enable completely new potential applications or just a more economical substitution for previous solutions: for example in the automotive industry in lights, door modules, air conditioning systems, water chambers or e-boxes, in lid seals, control equipment and sensors, in various household appliances, in switchgear cabinets and in medical engineering. In the electromobility branch, in power generation plant such as solar and wind generators and also in the field of LED technology, FIP(F)G techniques are being utilised ever more frequently.

*Köpp offers any amount of know-how in finding the optimum sealing system."*

*Dr. Ralf Tahhan, Key Account Manager*

*Sounds like a "seal for all seasons", doesn't it?*

**Dr. Tahhan:** I myself would be very happy if that was the case but the picture isn't quite that simple. An optimum "off the peg" sealing system is hardly possible. FIP(F)G sealing systems are indeed very common but not always the ideal solution. Which sealing system to use is always a question of the technical specification and the anticipated climatic and chemical environment of the application. To clarify this question one needs an all-round specialist know-how which is definitely available at KÖPP. Together with our customers, we always look for and find the best possible solution. You can, by the way, find out more on the subject on page 11 of this issue.

## Perfect sealing with PUR directly on the component



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?*

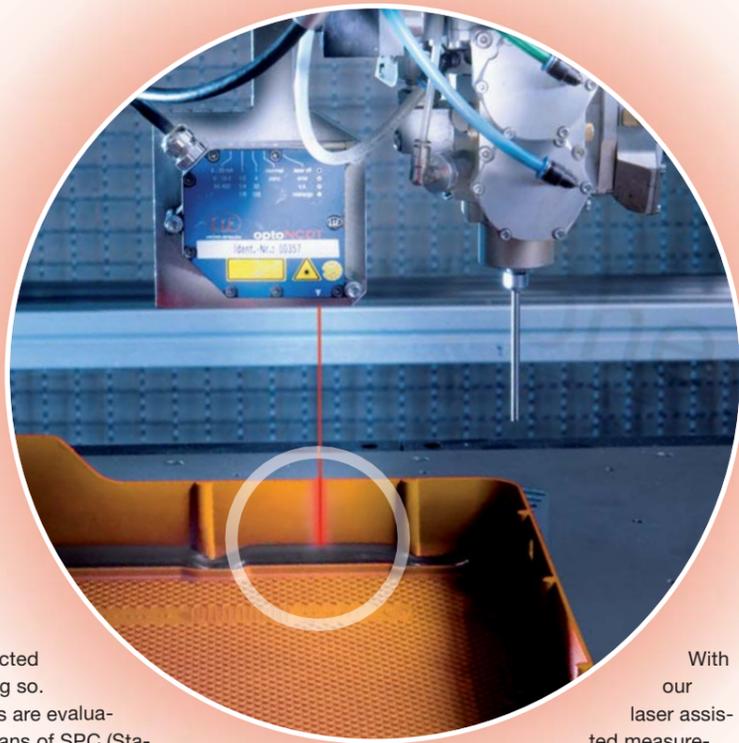
**Dr. Tahhan** (laughing): Briefly? I'll try. In the FIP(F)G process, a one or two-component sealing system still in a fluid, uncured state is applied in situ – i. e. directly onto the

component – with the aid of a robot and faithful to the contour. In so doing, the reactivity of the component is tuned to the production process and the fluidity to the type of component. Thus low-viscosity systems are deployed in simpler, two-dimensional groove applications and by contrast, shear thinning or thixotropic



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 part 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

## Ultra-precise dosing to 0.5 mm

Adhesive bonding, sealing or casting applications from 1 component materials form the perfect complement to our multi-component sealing systems. Which is why KÖPP has long since set store in 1 component dosing systems for their most precise dosing. The high level of demand speaks for itself. Quite recently, the production facilities in Bovenden were enhanced with an additional dosing robot which, by integrating the dosing head into the line control, guarantees the application of a volume-precise quantity independent of dosing speed and flow characteristic of the material. "Our 1C dosing system can apply seal widths down to 0.5 mm with perfection. Conversely, however, with the same system, it is possible to form a triangular profile bead with a temperature stability of up to 250°C. Our customers also know they're in good hands with the adhesive bond jointing process." says Dr. rer. nat. Ralf Tahhan. "The design of the components can turn out significantly cheaper in certain circumstances. It's in just this regard that we can give them valuable advice and support." The maxim here, too, is that the overall concept has to be right.



## Customer echo

# Jurima focuses on quality and diversity

**Jurima Dichtungen GmbH** has been both a renowned manufacturer and a merchant for seal engineering, elastomers and plastic products for more than 40 years. For the past 30 years, the Augsburg company has been procuring seals from cellular rubber, foamed rubber and FIP(F)G sealing systems from the House of KÖPP. Areas of application: special machine construction for virtually all sectors. **insight.** spoke with Stefan Riedel, an officer of the company, about this cooperation.

*Herr Riedel, you are a sealing system specialist. What significance has a seal within a product?*

**Stefan Riedel:** Good, long-term durable, sealing systems are top ranking in terms of significance. They are absolutely indispensable to the

The principle of concentrating on a few competent suppliers, such as KÖPP is in the area of sealing materials, gives us considerable advantages on the procuring side. That makes us more competitive. An advantage from which our customers also ultimately profit.

*Good, long-term durable, sealing systems are top ranking in terms of significance."*

*Stefan Riedel, Company Officer, Jurima Dichtungen GmbH*

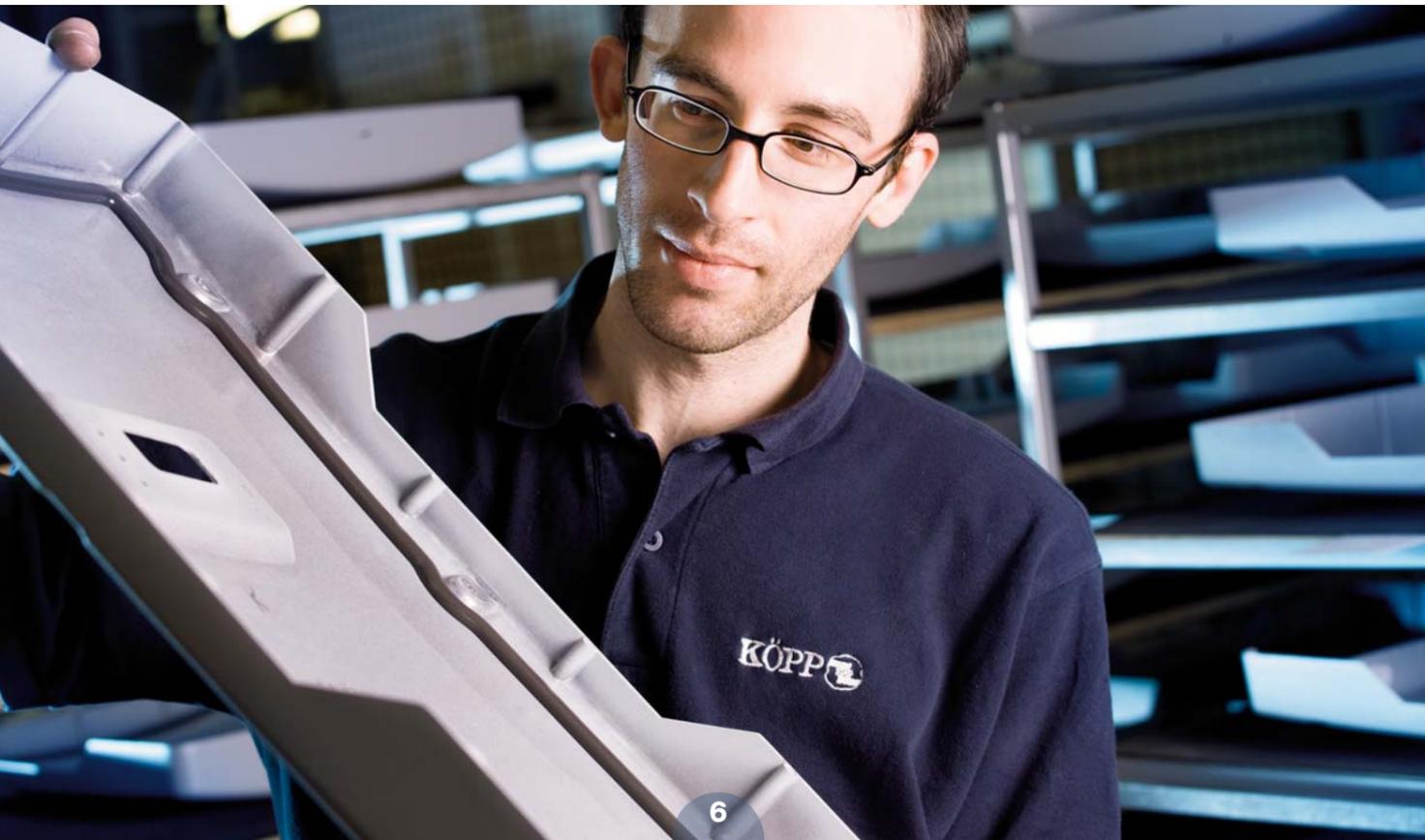
functionality of a machine or component. The quality of our products, their reliability and function depend quite materially on the seal.

*What is the recipe for the success of your decades of business association with KÖPP?*

**Stefan Riedel:** We cultivate the same quality, price and delivery politics. That is, of course, crucial for ourselves and for our customers. On top of this, we profit from KÖPP's enormous spectrum. Within the cellular materials, KÖPP offers a rounded, coherent concept – everything under one roof including possible necessary alternatives.

*How has the demand for freely applied seals developed in your company?*

**Stefan Riedel:** Naturally we've been exploiting the advantages of FIP(F)G sealing systems for a few years now. We have already substituted other sealing systems with this innovative process in the past. It's always worthwhile putting existing sealing solutions to the test against the background of new developments. It goes without saying that each application demands its own dedicated optimum solution. In this respect we're always in productive dialogue with our contacts at KÖPP and so far we've always found the appropriate solution.





View of the production hall, Industriestraße 9, Bovenden

Innovation at the Aachen site: 4C plant from Rampf

# Aachen and 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 m<sup>2</sup> production floor and 1,500 m<sup>2</sup> 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



**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.

**Aachen beefs up**

The steadily growing acceptance of the FIP(F)G technology last year prompted the management to offer their customers a production facility at our Aachen HQ. This means that KÖPP can not only produce faster but also expand its customer base in West Germany and Europe due to the clear logistic advantages. "We have ample warehouse capacity here in Aachen which can still be extended. In addition to our dosing robots for one or two-component sealing systems, the newly acquired 4C dosing plant is certainly the most innovative item on our machine inventory", reports Production Manager Peter Siemer. You can find out more about this plant, which adds a hard-wearing elastomer skin to a soft, elastic 2-component sealing foam, on page 10 of this issue.



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.



Core-sheath seal

### 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.

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.

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.

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

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

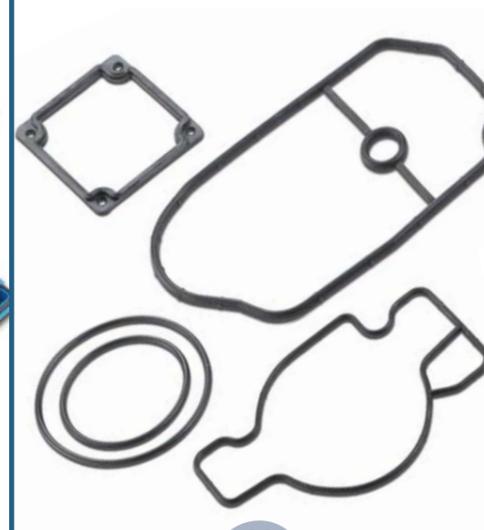
#### FIP(F)G

Freely applied sealing bead



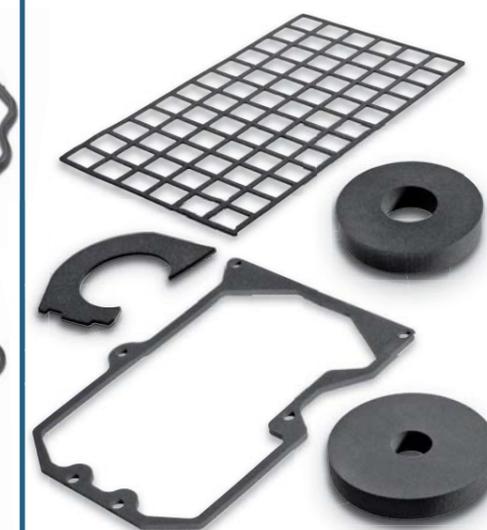
#### Foamed rubber

Moulded foam rubber seals



#### Cellular rubber

Die-cut seals





Dr. Ralf Tahhan (left) visits one of his favourite artists: Professor Werner Liebmann

## “Art washes away from the soul the dust of everyday life.” Picasso

This sentence perfectly describes why **insight.** – every now and again and in no particular order – also devotes some space to the lighter topics. Do you remember – in our last issue, we introduced a few of our employees and their hobbies? “Our Doctor of Chemistry”, Ralf Tahhan, not only cultivates the “fine art of sealing” – the visual arts are also a passion of his.

His enthusiasm for this already began in his youth. As “our man in Berlin” every imaginable opportunity is obviously on offer to him in this art metropolis. “Apart from the classically modern, I find the work of street artists wildly exciting. After the underground activity over which opinions can certainly differ, the best is now being presented even in the serious galleries. They’re

worth a visit.”

Among Tahhan’s favourite artists are Gerhard Richter, Neo Rauch, Willi Sitte or Bernhard Heisig. “Art works of this order are, of course, prohibitive for the normal purse.” It’s for just this reason that his interest is in their legitimate

successors who often found themselves to be the artistic equal of their role models. “I’m particularly impressed by the Heisig students. One of his best known, Herr Prof. Werner Liebmann, is someone I know personally and hold in very high regard.”

*Here, I go along with Beuys: everyone is an artist.”*

*Dr. Ralf Tahhan on the question of whether he himself is artistically talented.*



### insight. Publishing information

Editor: Christof Carduck  
Text: Susanne Neumann  
Translation: Dr. Anja Rütten, Gareth McMillan  
Sprachmanagement.net  
Pictures: HOSAN Photography, Jürgen Wilke,  
Studio 9, Jochen Rohner, Cornelia Lochmann  
Design: WILKEDESIGN, Aachen  
Printer: Druckerei Scholz

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