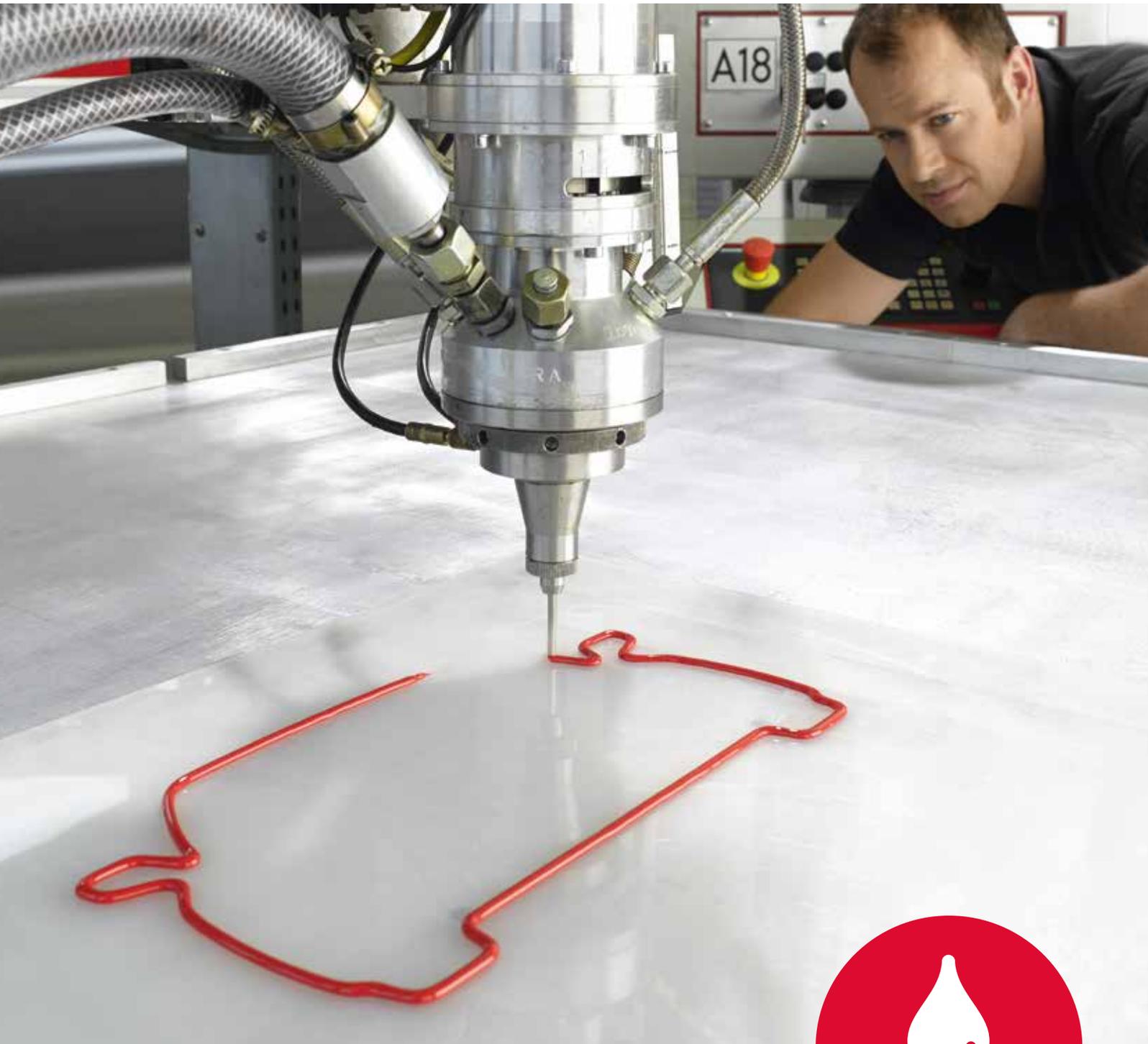


# Sealing systems | **Multi-talent based on PU and silicone**





» For more than 35 years, we have been developing and manufacturing innovative sealing systems based on polyurethane and silicone. Our products and solutions represent efficient sealing, highest quality, and exceptionally easy handling. Key features include low water absorption, good adhesion, high long-term temperature resistance, and cost-efficient processing. Around the world, customers from various sectors, including the automotive, energy, household, and packaging industries, put their faith in our liquid and thixotropic sealing systems. «

# Innovative solutions for sealing, bonding, casting, and protecting

## RAMPF Group

The international RAMPF Group stands for **engineering and chemical solutions** and caters to the economic and ecological needs of industry.

Our range of competencies includes:

- > Production and recycling of **materials** for modeling, lightweight construction, bonding, and protection
- > **Technical production systems** for precise, dynamic positioning and automation, as well as technologies for complex composite parts production
- > **A comprehensive range of solutions and services**, particularly for innovative and customer-specific requirements

This know-how helps our customers achieve profitable and sustainable growth.

Trusting relationships are of utmost importance to RAMPF. They are a vital part of the family-owned company's success story which now spans over 35 years.

RAMPF thinks globally and acts locally. The company has production facilities strategically located in Germany, the United States, Canada, China, and Japan.

## RAMPF Polymer Solutions

The company from Grafenberg, Germany, is a leading developer and manufacturer of reactive resin systems based on polyurethane, epoxy, and silicone.

The RAMPF Polymer Solutions product portfolio includes liquid and thixotropic sealing systems, electro and engineering casting resins, edge and filter casting resins, adhesive systems, and hot-melt adhesives.

Research and development have top priority at RAMPF Polymer Solutions. A large innovation center is available for laboratory and application technology. Every day, this center is involved in work on developing new products, adapting existing products to specific customer requirements, and testing a huge range of material combinations. In doing so, it places particular emphasis on the use of renewable raw materials.

It goes without saying that RAMPF Polymer Solutions provides customer support during product introduction and the production process.

The company is certified to ISO 9001, ISO/TS 16949, ISO 50001, and ISO 14001.



Machine Systems



Production Systems



Composite Solutions



Eco Solutions



Polymer Solutions

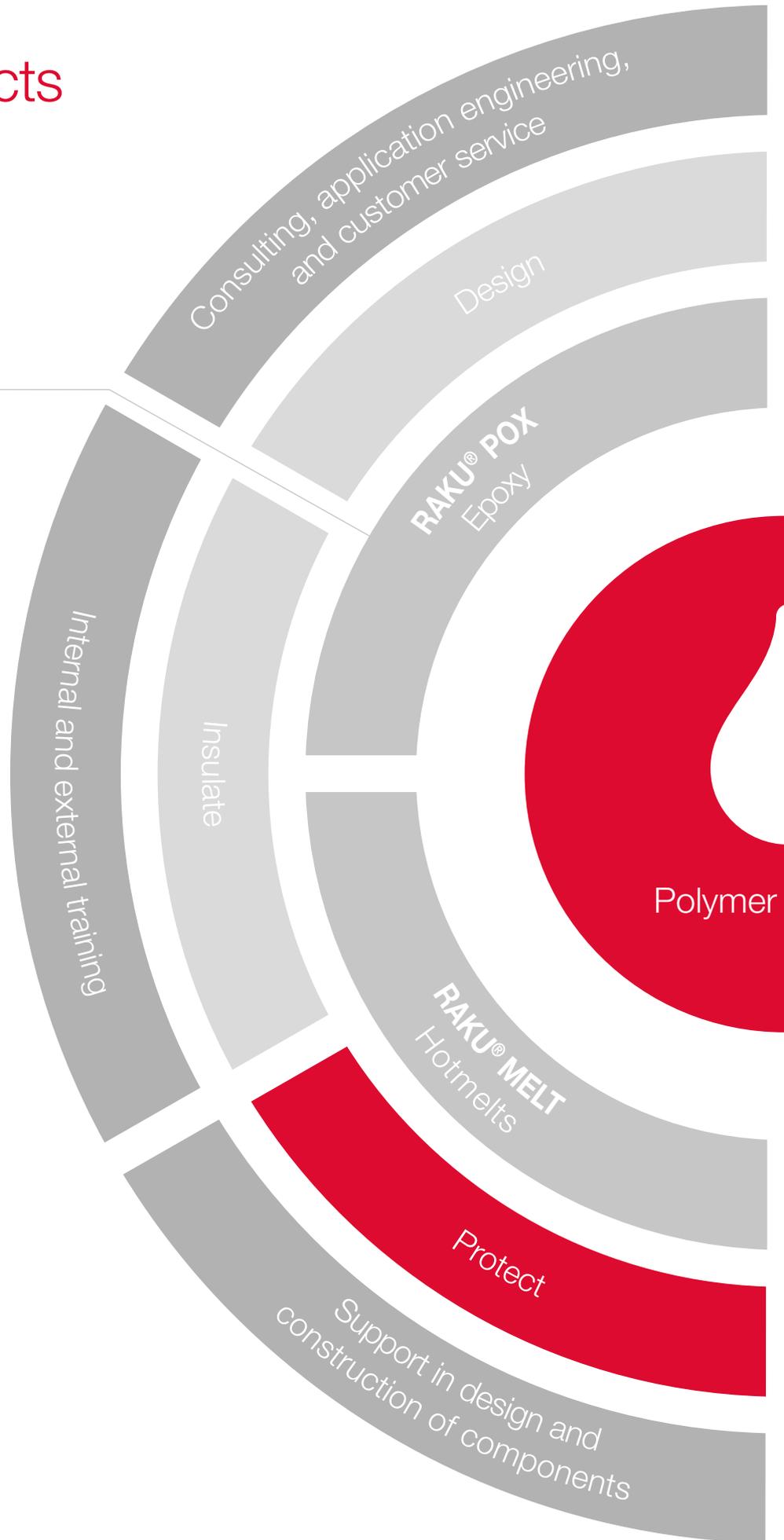


Tooling Solutions

# Range of products and services

## 01 | Materials

Innovative, high-performance, sustainable – RAMPF Polymer Solutions develops and manufactures reactive resin systems based on polyurethane, epoxy, and silicone, and places a particular emphasis on the use of renewable raw materials.





**02 | Applications/Technologies**

Future-oriented, high-tech, professional – the RAMPF Innovation Center uses the latest systems and test procedures to develop new products, adapt existing products to specific customer requirements, and test a huge range of material combinations.

**03 | Services**

Customer-oriented, skilled, committed – it goes without saying that RAMPF Polymer Solutions provides customer support throughout the development and production process. It also offers material and applications training and innovation workshops.

Technology



# Technology | In-situ gaskets

Innovative liquid sealing systems for the solutions of tomorrow

Reliably and effectively protecting components from moisture, chemicals, and various environmental influences – this is the purpose of the in-situ gaskets based on polyurethane (RAKU® PUR) and silicone (RAKU® SIL) from RAMPF Polymer Solutions.

Unlike gaskets that are inserted or adhesive-applied, liquid gaskets

> **F**ormed **I**n **P**lace **G**askets (FIPG)

> **F**ormed **I**n **P**lace **F**oam **G**askets (FIPFG)

are applied in-situ using dispensing systems, and bond within a very short time.

The sealing systems adapt perfectly to the shape of the component and lie relaxed in the groove. The chemical properties are tailored to the relevant requirements.

As a result, FIPGs and FIPFGs are used for a wide variety of applications in the automotive, electrical, and household industries, as well as for mechanical and appliance engineering.

By developing new RAKU® PUR and RAKU® SIL products, and optimizing existing ones, RAMPF is meeting the growing requirements of the market in terms of seal quality and geometry, as well as mechanical, thermal, and chemical resilience.



## Your benefits

- > Perfect seal thanks to automatic application of the liquid gasket without any coupling points or adhesives
- > Economic benefits thanks to accelerated and simplified production and assembly processes
- > Reliable and long-lasting seal – the gasket is firmly attached to the component and cannot be removed
- > No tooling costs, flexible adjustments to updated components using NC technology



Materials



# Material types | Polyurethane or silicone?

We have the best solution for your application

RAMPF Polymer Solutions provides outstanding sealing systems based on polyurethane and silicone. Choosing the most suitable sealing material is a decision based firstly on the processing pro-

cedure and secondly on the end properties desired and the areas of application.

	Polyurethane (RAKU® PUR)	Silicone (RAKU® SIL)
<b>Operational scope</b>	<ul style="list-style-type: none"> <li>&gt; Heat resistance: long-term: from -40 to +90°C short-term: +160°C</li> <li>&gt; Chemical resistance to fats and oils, detergents, aqueous solutions, etc.</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Heat resistance: long-term: from -60 to +200°C short-term: +300°C</li> <li>&gt; Exceptional chemical resistance for extreme environments</li> </ul>
<b>Properties</b>	<ul style="list-style-type: none"> <li>&gt; Outstanding physical properties such as compression set, tensile strength, break elongation, etc.</li> <li>&gt; Low water absorption</li> <li>&gt; UV-resistant systems</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Optimal physical properties remain constant across almost the entire temperature range of the application</li> <li>&gt; Outstanding compression set, even at high temperatures</li> <li>&gt; Extremely water-resistant</li> <li>&gt; Water absorption: 0.3%</li> <li>&gt; Excellent radiation resistance: UV and microwave radiation</li> </ul>
<b>Bonding</b>	<ul style="list-style-type: none"> <li>&gt; Excellent adhesion on almost any substrate</li> <li>&gt; Perfectly matched pre-treatment systems available</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Outstanding adhesion to a wide variety of substrates</li> <li>&gt; Pre-treatment available if necessary</li> </ul>
<b>Construction</b>	<ul style="list-style-type: none"> <li>&gt; Compression rate: 30–60%</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Compression rate: 10–30%</li> </ul>
<b>Flame retardancy</b>	<ul style="list-style-type: none"> <li>&gt; UL 94 (HF-1, HF-2, HBF)</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Flame retardancy in line with UL 94 HBF for all silicone foam gaskets</li> </ul>
<b>Sustainability</b>	<ul style="list-style-type: none"> <li>&gt; Formulations based on renewable raw materials (biopolyols) available</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Ecologically safe, no risk to soil, water, or air</li> </ul>

Manufacturing  
process



# Manufacturing process | The art of foaming

Chemical know-how for perfect sealing processes

Perfect chemistry: Chemists, engineers, and technicians work hand-in-hand at RAMPF. As a result, we can offer you solutions that move you forward economically and in terms of materials and production engineering. To do so, we use high-quality sealing materials and efficient processes.

## Components

- > Foam gaskets consist of a liquid to paste-like component A (polyol) and a component B (isocyanate)

## Reaction

- > Exothermic reaction
- > Occurs evenly and reliably at room temperature

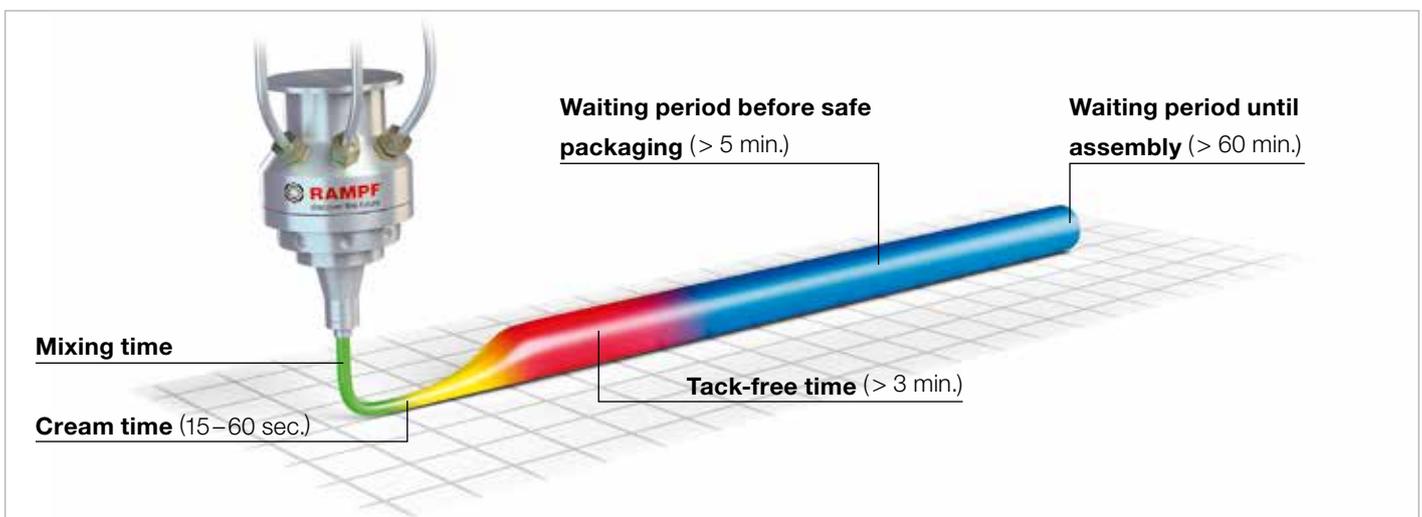
## Foaming process

- > **Mixing time:** homogeneous mixing of the components in the dynamic mixer
- > **Cream time:** time till the system begins to react or expand
- > **Tack-free time:** time after which the gasket surface is no longer tacky and can be touched without causing damage
- > **Waiting period before safe packaging:** period in which the foam gasket is sensitive to pressure and should not be packaged
- > **Waiting period until assembly:** the foam gasket reaches its final state in this period, and the components can then be safely assembled

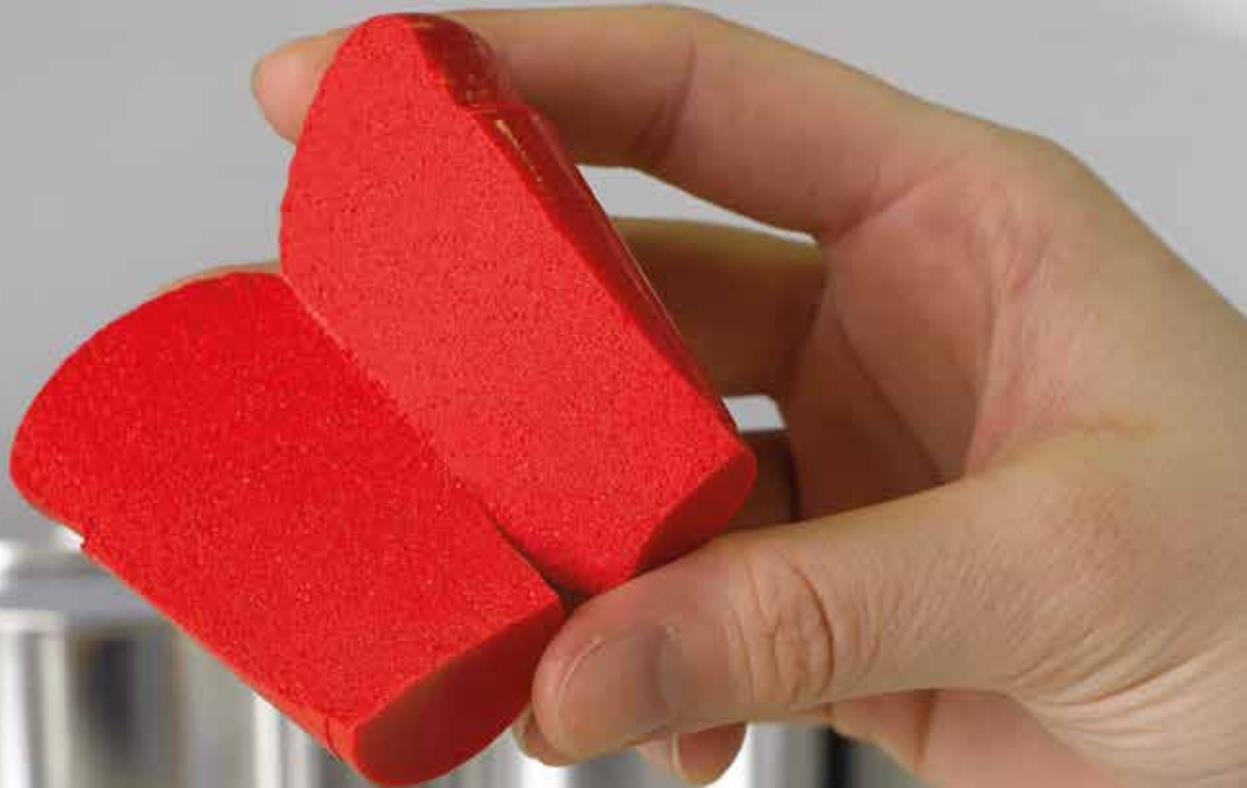


## Your benefits

- > More than 35 years of experience in developing and marketing innovative sealing systems
- > In-depth technical consulting on selecting the appropriate sealant and designing your components to optimize sealing results
- > Joint process development and optimization
- > Material, machine, and process from a single source – the complete expert service from RAMPF



Sealing  
systems

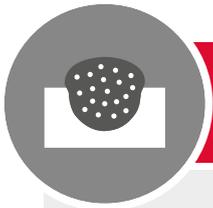


# Sealing systems | What is your foam type?

The perfect material for current and future sealing requirements

We offer our customers tailored solutions and a wide range of high-quality standard products with outstanding chemical, physical, and mechanical properties.

Highest levels of flexibility guaranteed – your gasket will be adapted precisely to the conditions of your product and process. Of course, it is also available in any color, shape, or form.

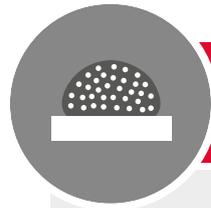


## Liquid foam gaskets

Require a pronounced groove and a level application surface.

### Advantages:

- > Self-leveling
- > Tolerances < 0.3mm possible
- > Gasket with cross-section < 1mm possible
- > Application in grooves and molds

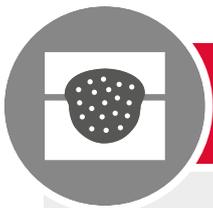


## Thixotropic foam gaskets

Stable sealing systems can be used on the surfaces of three-dimensional components or where there is a shallow groove.

### Advantages:

- > Reliable sealing, particularly with complex three-dimensional contours
- > Overhead application with no run-off/dripping
- > Height/width ratio of 1:2 to 1:1 possible
- > No excessive penetration in open-pored materials (textiles)

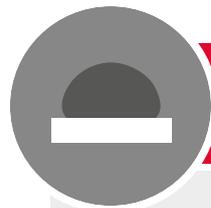


## Molded foam gaskets

Special gasket shapes can be created using molds; lightweight, soft foam core with compact, tough skin.

### Advantages:

- > Short reaction and demolding times
- > Water-repellent
- > High mechanical strengths
- > Highly abrasion-resistant surface



## Compact gaskets

Produced using polymerization without any change in volume.

### Advantages:

- > Variable from liquid to thixotropic
- > Wide range of hardnesses
- > Very high mechanical strength
- > High elasticity (up to 500%)
- > Very good vibration and sound insulation
- > Pressure-resistant up to 200 bar

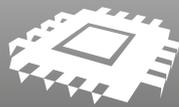


Industries



### **Mobility**

Our products efficiently and reliably seal a wide range of components in automobile and vehicle construction, thus contributing to safe journeys.



### **Electrical / Electronics**

Our sealing technology provides dependable and efficient protection for electrical and electronic parts, and so helps maintain their long-term functionality.



### **Household**

Our sealing systems are used in a variety of household applications and help ensure performance and safety.

# Your industry | Your application

Market-driven solutions based on polyurethane and silicone

Every application is different – our gaskets fit anywhere. The broad spectrum of properties of our RAKU® PUR and RAKU® SIL systems and the experience and expertise of our staff ensure you will find the perfect solution for your requirements.

We have more than 400 recipes on the market and our experts – chemists, engineers, and application technicians – work daily on developing new, high-performance products. We also adapt existing products to specific customer needs, thus enabling them to be used in a wide range of applications.

Sealing systems from RAMPF meet the highest quality requirements and are used by leading manufacturers in, for example, the automotive and electronics industries. Renowned institutes test and confirm the high quality of our products.

Our many years of experience in product development and in processing technologies enable us to provide you with comprehensive advice on materials and process engineering issues.

Our sealing systems live up to our promises – and that applies to your application, too.



Electrical/Electronics



Household appliances



Packaging



Medical technology



Energy technology



Mobility



Applications



# Automotive | Fast and powerful

High-performance, long-lasting seals for automobile and vehicle construction

A tight seal – dependable and efficient protection from moisture, chemicals, and various environmental influences – is fundamental to the long-term performance of automotive parts.

Products of the RAKU® PUR and RAKU® SIL brands meet the most challenging requirements of the automotive industry. These include strict emissions regulations and the very highest NVH (noise, vibration, harshness) standards. In this way, our products play their part in creating a quiet and odor-free driving experience.

Automakers not only measure speed in miles per hour, however. To survive in this competitive market, ultrafast process chains in production are also vital. This is why RAMPF developed the fast-curing foam gasket RAKU® PUR Speed. The gasket is ready for use less than three minutes after application.

Leading manufacturers and suppliers put their faith in our sealing systems – across a wide variety of applications:

- > Door and door-locking modules
- > Brake lights and headlights
- > Taillights
- > Electrical enclosures
- > Ignition coil covers
- > Fuse boxes
- > Ventilation grills, and much more



## Your benefits

- > Approval from leading automakers for internal and external use
- > ISO / TS 16949
- > Low-emissions systems to VDA 278 / VDA 270
- > Meets DBL 5452.13 8 (Daimler), TL 848 (VW), MS AY560 (Chrysler), and many more
- > Reduction in noise and vibrations (NVH – noise, vibration, harshness)
- > Meets fire protection requirements to UL 94



Loudspeaker



Flutter valve



Door module

Applications



# Electrical / electronics | Reliable protection

Sealing systems ensure the long-term functionality of your application

Consistently and efficiently protecting electronic components and operating equipment from moisture, chemicals, and various environmental influences ensures both user safety and the long-term functionality of the application.

Product lines of the RAKU® PUR and RAKU® SIL brands can be applied two- and three-dimensionally, and meet the increasingly stringent requirements for flame-retardant materials to UL 94 (HF-1, HF-2, HBF). These flame-retardant foam gaskets are used wherever partial ignition sources are present.

RAMPF foam gaskets are also certified to UL 50 and UL 50E. This test specification for control cabinets and other electronics housings has now spread from the United States, Canada, and Mexico to become a global standard for the highest quality foam gaskets.

These sealing systems are used in a wide variety of indoor and outdoor electrical and electronic applications:

- > Control cabinets
- > Industrial lighting
- > LED modules
- > Operating equipment
- > Electrical enclosures
- > Housing covers
- > Solar inverters, and much more



## Your benefits

- > UV-resistance available
- > Listings: UL 50 (tightness), UL 94 (flame retardancy), DIBt (German Institute for Construction Technology)
- > IP codes (degree of protection of housing from touch, foreign objects, and water) such as IP 65, IP 66, and IP 67 can be met
- > Anti-bacterial to VDI 6022 guideline possible
- > Temperature range from -60 to +250°C



Industrial lighting



Control cabinet door



Electrical enclosure



Applications

# Packaging | Safeguarding your valuables

Strong, lasting seals for metal and plastic lids

Nothing gets in or out: The packaging industry has a very wide range of requirements, and the standards are high.

We offer our customers the best products for their packaging application – from a technical, economic, and ecological perspective.

Liquid foam gaskets from RAMPF provide dependable and effective protection in the food and drink industries. They also protect against aggressive media and extreme temperatures in chemical and pharmaceutical applications.

RAKU® PUR and RAKU® SIL products exhibit excellent adhesion to metal and plastic, and also meet the strictest hygiene requirements and EU and FDA regulations for food packaging.



## Your benefits

- > FDA approval/EU food regulations
- > Wide temperature range
- > Best chemical resistance
- > Highest elasticity and tear resistance
- > Extremely easy processing



Packaging lid



Packaging lid



IBC lid

Applications



# Household | Functionality and safety

## Safe and silent household appliances

The faultless operation of household appliances is one element of safety in the home. RAMPF sealing systems play a crucial role in the functionality and reliability of these appliances – and therefore also in the satisfaction of the end customer.

Products of the RAKU® PUR and RAKU® SIL brands meet the highest requirements. They consistently and efficiently protect household appliances from moisture, chemicals, and various environmental influences.

Flame-retardant properties to UL 94 (HF-1, HF-2, HBF) are available. The vibration-damping properties of our sealing systems help various household appliances to operate quietly.

Our applications:

- > Components for dryers
- > Power units for dishwashers
- > Sealing, damping, and insulation applications for washing machines
- > Sealing sinks and hobs, and much more



### Your benefits

- > IP codes (degree of protection of housing from touch, foreign objects, and water) such as IP 65, IP 66, and IP 67 can be met
- > Meets fire protection requirements to UL 94
- > UV-stable sealing systems
- > Temperature range from -60 to +250°C
- > Excellent noise and vibration damping



Services



# Comprehensive support | From concept to finished product

Materials, processing, consulting – your end-to-end partner

RAMPF offers its customers complete support – from product development to market launch:

## Laboratory and application technology

- > Initial consultation on selecting the most suitable material and processing procedure
- > Customized development of your material or adaptation of a product from our comprehensive portfolio
- > Application engineering consultations for component design and manufacture of sample parts in near-series conditions
- > Manufacture of prototypes

## Processing expertise

- > Support and consulting for applications as well as process development and optimization
- > All-encompassing machinery pool for conducting near-series customer trials
- > Low-pressure mixing and dispensing systems from RAMPF Production Systems for processing one, two, and multi-component materials

## After-sales service and training

- > Our customer service does not end with the start of series production: Technical field representatives, application technicians, and product developers are all at your service
- > The RAMPF Academy offers product and application training courses that emphasize on sharing experiences



## Your benefits

- > People come first – trusting and successful cooperation with customers is a top priority
- > Customer-focused and progress-oriented – we work with our customers to develop the solutions of the future
- > Comprehensive customer advice and cross-process expertise
- > Material, plant, and process technology from a single source – RAMPF offers a full range of services
- > Many years of experience in processing technologies such as foaming, casting, bonding, coating, and spraying



Services



# Think global | Act local

With production on three continents and sales partners worldwide, we are always there for our customers – wherever they are

RAMPF thinks globally and acts locally. In addition to our state-of-the-art production facility in Grafenberg, our products are also produced at key strategic sites in the United States and China.

No matter where they are produced, the same applies – when it says RAMPF, it *is* RAMPF. The highest standards of quality apply to our production in both the United States and China, which has helped our facilities become very successful. Our foreign subsidiaries RAMPF Group, Inc. and RAMPF (Taicang) Co., Ltd are experiencing rapid growth, and ever more customers are placing their trust in RAMPF quality.

Of course, there is more to it than just production standards. The high quality of RAMPF products is also based on first-class advice and a comprehensive array of services.

This strategy is also supported by our global network of sales partners and experts at our sales offices in the United States, China, and Japan. They ensure our customers receive rapid and expert advice – no matter where they are and which industry they represent.



## Your benefits

- > Global presence of our products and our experts
- > High level of flexibility in production
- > Short delivery times
- > Comprehensive consultation



# RAMPF Group | Locations

