



MEDICAL APPLICATIONS



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EXPERTISE THAT SUPPORTS HEALING

Innovative nonwovens and polyurethane foams accelerate healing

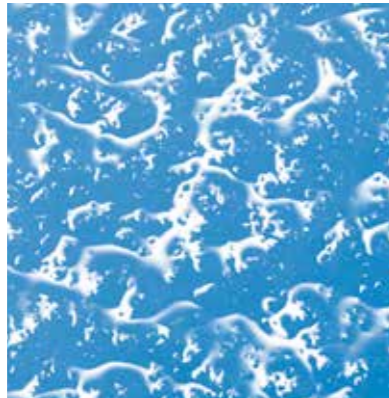
A new understanding of health and our own bodies, the increase of chronic diseases due to growing life expectancy and the greater active involvement of patients are all providing new challenges for medical technology. Modern product solutions need to support the self-healing powers of the body, accelerate the healing process and enhance wellbeing. High performance nonwovens and polyurethane foams from Freudenberg Performance Materials have been designed to meet these requirements.

Whether in first aid dressings for everyday use or in modern, multi-layer dressings for chronic wounds, our products offer appropriate solutions and contribute to the recovery process. We place extremely high value on the biocompatibility and tolerability of our raw materials. Freudenberg components are used in Class 1-3 medical devices and in FDA-certified products.

Modern wound dressings are used to treat complex, hard-to-heal wounds such as pressure sores and diabetic foot or leg, for example.

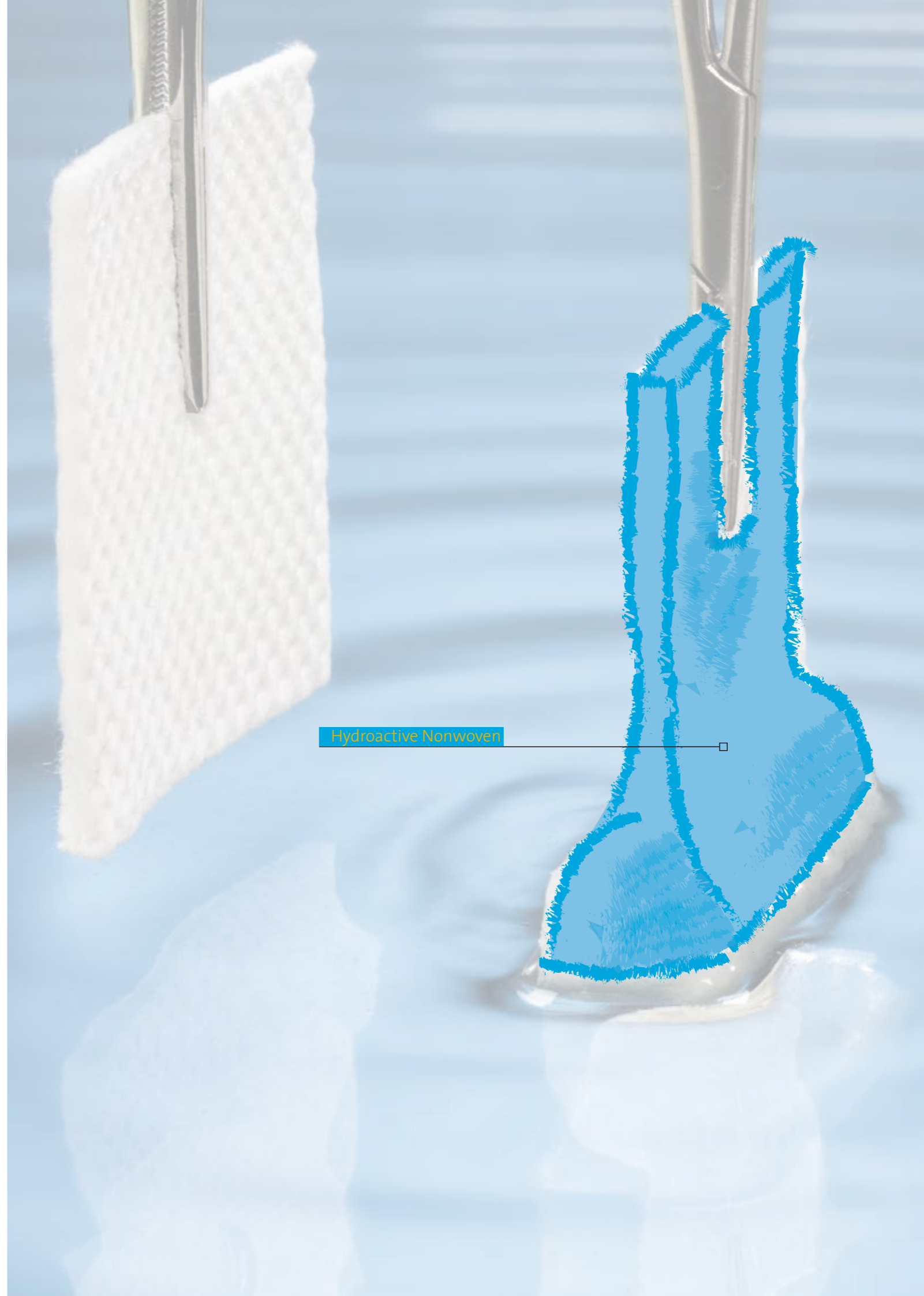
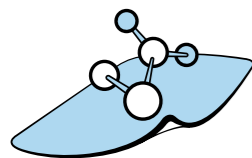
Freudenberg Performance Materials manufactures advanced flexible materials for these applications. These include nonwovens made from hydrogelling fibres, hydrophilic polyurethane foams and nonwoven/foam laminates with excellent absorption and retention characteristics. Antimicrobial solutions are especially designed for the treatment of critical or infected wounds.

NONWOVENS FOR ADVANCED WOUND CARE



Hydroactive nonwovens are part of innovative wound dressings. During the cleansing of the wound, the dressing absorbs high amounts of wound exudates and starts gelling. A hydroactive nonwoven of 2 mm thickness can absorb wound exudates of up to 25 times its own weight. After completion of the gelling process, the wound granulates and new blood vessels grow in the moist environment. In the epithelization phase, the wound cavity is filled with new granulation tissue and the surface begins to heal.

Besides a large standard portfolio, there is unlimited potential for customized solutions. We can offer different kinds of fibres, e.g. Chitosan or PVA.



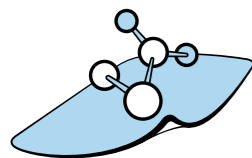
HYDROPHILIC PU FOAMS FOR ADVANCED WOUND CARE

Offering superior absorbency and comfort, our medical grade, hydrophilic polyurethane foams are an ideal choice for modern wound dressings.

Produced from a proprietary blend of materials in an ISO 13485 facility, our foams are designed with wound care in mind. Soft to touch and conformable our foams offer excellent patient comfort. With high absorption and retention characteristics, absorbing 20 times its own weight in fluid, our foams are a market leader for wound dressings. Our pour to thickness manufacturing process allows us to produce in a wide range of thickness, from 1,5 mm to 7,0 mm.

With laminations to PU film available, we can supply a near finished material with high breathability. PU foams laminated with hydroactive nonwovens increase in combination absorption capacity and retention.

In our innovative pilot line antimicrobial or other additives can be integrated in a real production environment.



EFFECTIVE AND VERSATILE COMPONENTS FOR TRADITIONAL WOUND CARE

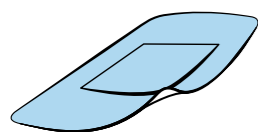
Freudenberg Performance Materials manufactures innovative components for traditional wound care. Whether for classic first aid dressings, post-operative wound dressings or compresses, our materials offer the right solution for every customer and are the safe choice for a gentle healing process.

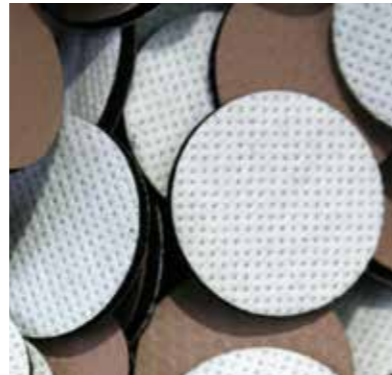
The wound pad should protect the injured skin but not stick to the wound, whereas the backing material should fix the wound pad and adapt perfectly to body contours. Different technological and innovative solutions are available:

- Wound pads with antimicrobial agents prevent bacteria growth in the wound dressing
- Point-sealed (PS), glazed or net wound contact layers prevent the pad from sticking to the wound
- Cross-elastic and bi-elastic backing materials adapt to any movement

For professional applications such as post-operative island dressings, wound compresses and coverstocks, our solutions provide unsurpassable functionality and reliability:

- Synthesized without bonding agents
- can be sterilized
- highly absorbent (up to 11 times their own weight), fast flow of exudates
- conformable



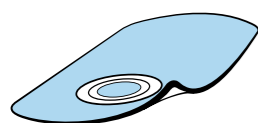


MORE QUALITY OF LIFE: ADVANCED COMPONENTS FOR STOMA CARE

Innovative components from Freudenberg Performance Materials provide safety and comfort to patients who become dependent on ostomy pouches following an operation. For them odor control is of utmost importance. Our high performance activated carbon filters are engineered to adsorb odors and thus significantly improve the quality of life of stoma patients. Due to our latest state of the art process and converting technology we offer a vast range of filter solutions for ileostomy or colostomy pouches, supplied in roll goods or in other required shapes and designs.

Our Comfort Covers comprise of a very soft, water repellent material which is pleasant to the skin and does not get caught in the clothing.

Our Flange/Collar materials are strong, coatable with skin friendly adhesives and can be welded to the ostomy bags.





Examples of pain relief dressings:

- With a pain killer (medication)
- Cold patch – cooling menthol
- Hot patch – warming capsicum

Freudenberg Performance Materials offers very soft, flexible and conformable backing materials for these applications. Release liners that protect the adhesive complete the portfolio.

Another growth market in the area of transdermal applications are systems for the targeted transport of active ingredients (needle free drug delivery systems).

Freudenberg Performance Materials supplies innovative, extremely thin, nonwoven-film composites that can be coated with a drug-in adhesive.

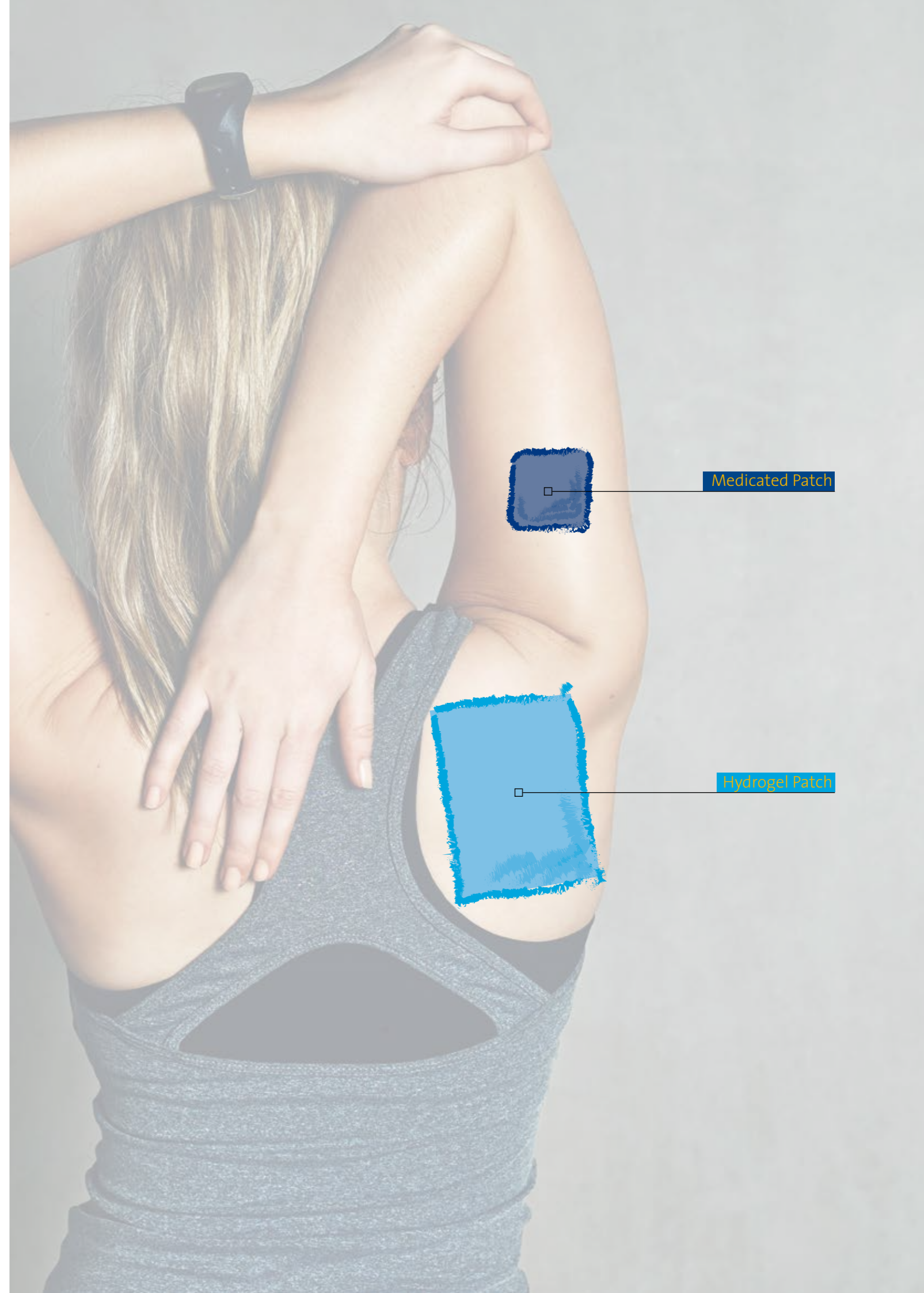
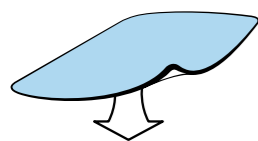
Examples of patches:

- Nicotine patches
- Hormone treatment
- Parkinson's disease
- Angina pectoris

WHEN MEDICATIONS GET UNDER YOUR SKIN: TRANSDERMAL SOLUTIONS

In transdermal (trans is Latin for “through” and dermal is Greek for “skin”) applications, backing materials are coated with a drug-in adhesive.

This traditional asian method of medication is expanding globally. Unlike local pain therapy and other medication with pills, transdermal medication does not affect the digestive system. The dosage is clear, simple and safe. These dressings or patches are placed on the skin and the drug permeates the skin directly to relieve pain or to apply other medications.



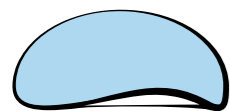
WHERE BEAUTY IS CONCERNED: FREUDENBERG PERFORMANCE MATERIALS FOR COSMETIC TREATMENTS

Our high performance materials adapt to various applications. Elasticity, conformability and softness are key characteristics for backing materials in wound care. Based on this knowledge, we also offer solutions (substrates and release liners) e.g. for face masks and eye patches.

Our nonwovens are used in spa treatments and for skin cleansing pads. For your customized project we offer the functionalization of substrates with cosmetically active ingredients.



Nonwoven Substrate





INNOVATING TOGETHER

As the inventor of nonwovens, Freudenberg is always striving for innovation by creating new technologies and combining in new ways existing technologies.

We are a pioneer in the development of nonwoven products for medical applications. In the 70's Freudenberg Performance Materials were the first replacing knitted wound pads by nonwovens.

Freudenberg offers a broad technology mix:

- Web forming: Dry laid, wet laid, spunlaid lines
- Bonding: Calender bonding, needle-punching, binder, air-through, hydro-entanglement
- Hydrophilic PU foam production: pour to thickness
- Functionalization: i.e. antimicrobials, dyes, hydrophobic treatment, odour adsorption (active carbon)
- Enhanced constructions: Lamination, extrusion and powder coating
- Converting: From mother rolls to slit reels

We offer tailor-made solutions for wound care, stoma care, transdermal applications and cosmetics to be included into CE class 1-3 and FDA registered products.

All products are held to the highest standards of hygiene and reliability and we are certified ISO 9001 and ISO 14001. Characteristics of our high performance materials are:

- Biocompatible raw materials
- Various possible surface designs
- Soft and kind to the skin

We are committed to delivering an outstanding level of professional service and product quality to our customers. Freudenberg Performance Materials – Your Safe Choice!



Your Project with Freudenberg

Freudenberg's pioneering spirit:

- Expertise from research and development to batch production

Freudenberg uses a multitude of nonwoven manufacturing technologies:

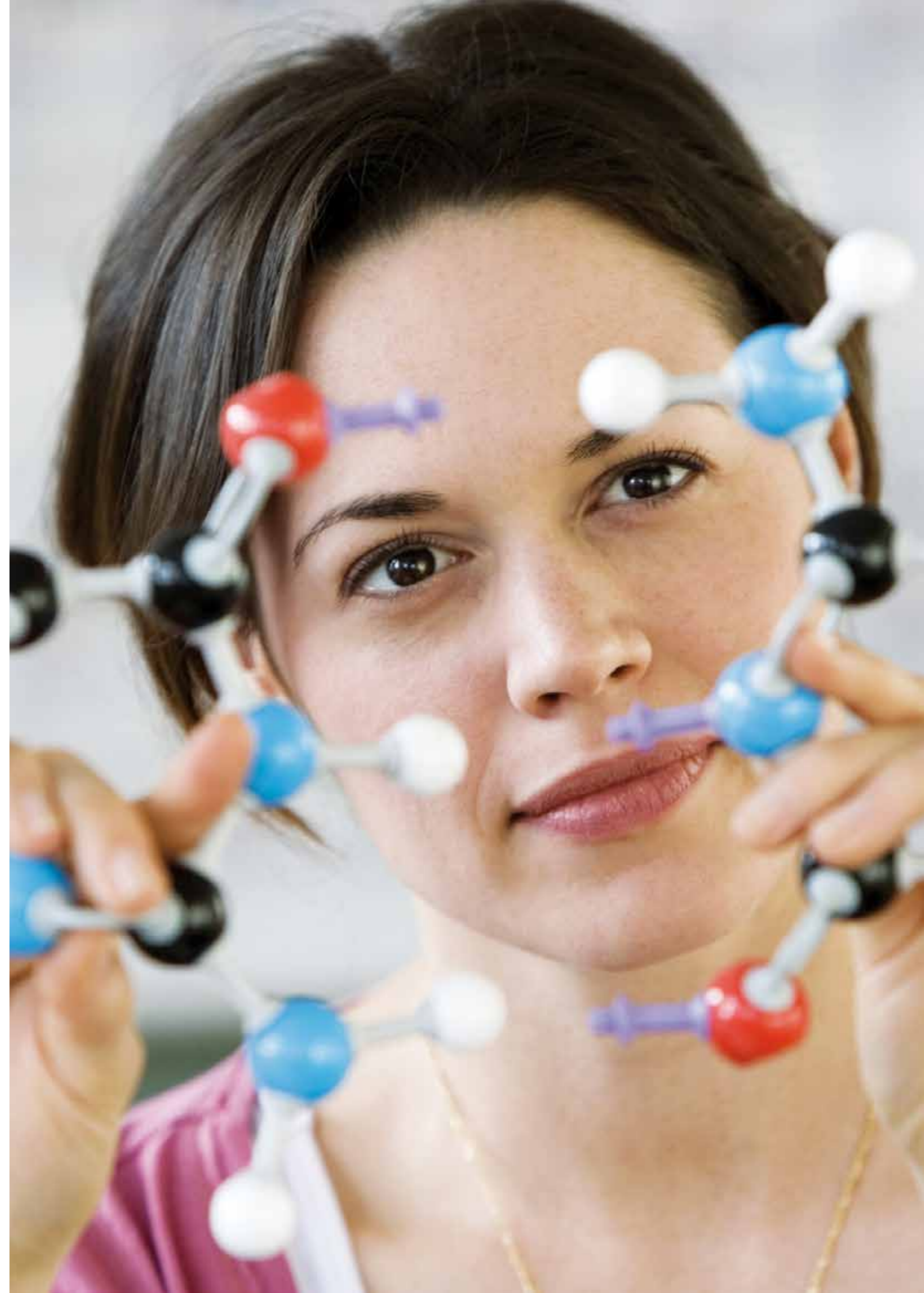
- Flexibility geared to customer needs

Freudenberg has a global presence:

- Tightly-knit international network and reliable partners guarantee on a consistent basis highest quality and operation standards all over the world

Three-step product development process:

1. Lab scale samples
 - Idea creation
2. Pilot line trials
 - Technical feasibility study
3. Production line trials
 - Validation of product and production process
 - Ramp-up from pilot line into standard production



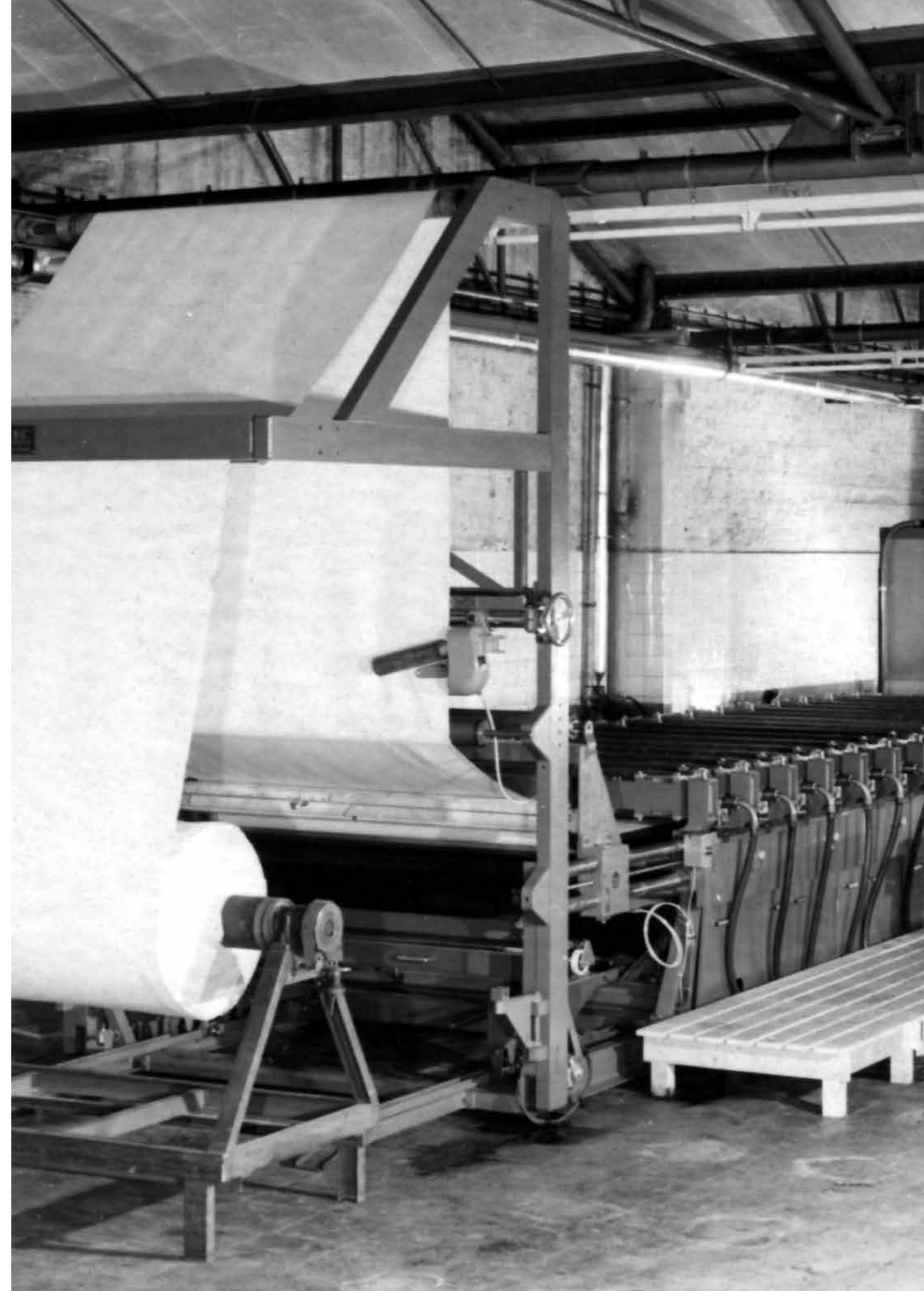


FROM NONWOVENS PIONEER TO LEADING SUPPLIER OF TECHNICAL TEXTILES

Freudenberg Performance Materials milestones

The invention of nonwoven fabric can be traced back to Freudenberg Performance Materials. In 1938, the company began developing substrates for synthetic leather and by 1948 Vlieseline interlinings and the Vileda window cloth had joined Freudenberg's portfolio. Today, the company is a leading global supplier of technical textiles for a wide range of markets and applications.

- 1849 Founding of Carl Johann Freudenberg-tannery
- 1948 Start of dry-laid staple fiber nonwovens production; introduction of Vlieseline interlinings and Vileda window cloths
- 1975 Market introduction of nonwovens for Stoma Care
- 1977 Market launch of nonwovens for Traditional Wound Care
- 1996 Start of antimicrobial finishing for Traditional Wound Care
- 2003 First nonwoven concepts for Advanced Wound Care
- 2009 Launch of Transdermal Solutions in Europe
- 2011 New generation of hydroactive nonwovens for Advanced Wound Care
- 2015 Freudenberg Performance Materials acquires Polymer Health Technology (PHT) in Ebbw Vale (UK), the leading specialist for polyurethane foam systems used in wound care





**“INNOVATIVE MEDICAL SOLUTIONS:
A STRONG PILLAR OF FREUDENBERG
PERFORMANCE MATERIALS.”**

FREUDENBERG PERFORMANCE MATERIALS

With more than 3,800 employees in 14 countries, Freudenberg Performance Materials is a leading global manufacturer of technical textiles for a wide range of applications. Our aim is to be pioneer in the technological development of innovative materials and new production processes. To reach this goal, we rely on the experience of our global experts in providing our international customers with tailored solutions that add real value.

We offer high-performance technical textiles not only for the construction industry. Our wide range of products includes solutions for automotive, apparel, hygiene, medical, shoe components and leather goods, as well as many special applications.

About Freudenberg

As a global technology group, we use our innovation power at Freudenberg to strengthen our customers' businesses and make the world a better place to live in.

With over 40,000 employees at more than 60 global locations, our products are developed in close cooperation with our business partners and the scientific community.

Today, Freudenberg nonwovens, filters, seals, vibration-control components, special chemicals, medical technology products, mechatronics, IT services and the latest cleaning products are an essential part of thousands of applications across more than 30 market segments



**WE ARE RIGHT THERE FOR YOU,
WHEREVER YOU NEED US.**

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