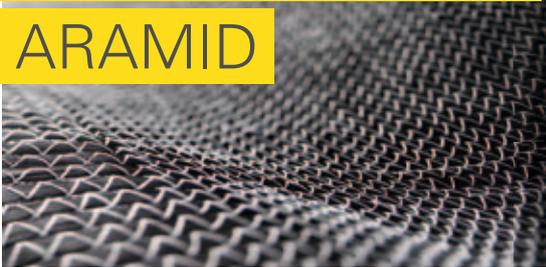


REINFORCING YOUR IDEAS

WITH GLASS, CARBON
AND ARAMID



WHATEVER YOU ARE PLANNING:
IT CAN BE SO EASY

REINFORCING YOUR IDEAS



Cutting-edge composite solutions made of glass, carbon and aramid

We are fascinated by new challenges as much as you are. We produce and develop the ideal fibre composite materials for your ideas – light, robust and resource-saving. **SAERTEX** offers you an ever-expanding toolkit of tailor-made non-crimp fabrics made of glass, carbon and aramid fibres. We can also support you with the appropriate on-demand services for engineering and production.



Potential for lightweight construction with non-crimp fabrics

- Up to 80% lighter than metallic materials
- Up to 5 x higher load-bearing capacity than steel
- No corrosion

Complete solution for added value

- Tailor-made: one modular system with more than 2,500 materials
- On-demand services for engineering and production

Innovation for top performance

- Customer-specific development
- Cross-linked knowledge and award-winning innovation

Success is teamwork

- Values of a family-owned business
- Global commitment on your behalf



Bruno Lammers
Company Founder and
Managing Partner

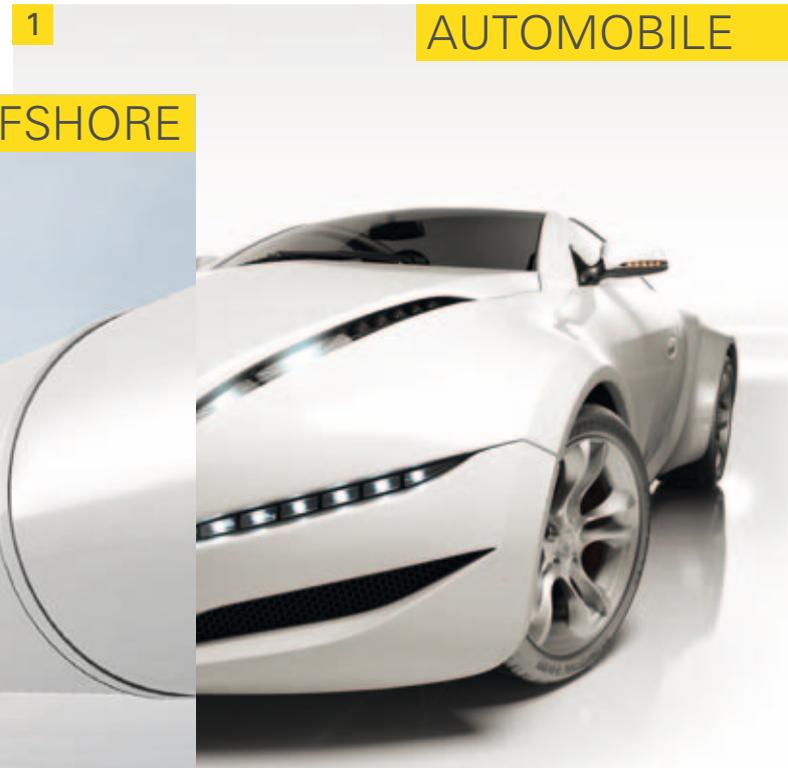
A family-owned business, at your service worldwide

- Established in Saerbeck, Germany in 1982
- 9 locations in 8 countries on 5 continents
- 50 countries with customer service
- 2,500 customer-specific product solutions
- More than 1,000 employees worldwide

NEARLY ENDLESS POTENTIAL APPLICATIONS

SAERTEX products are used successfully in many industries and sectors. Our products are prerequisites for our customers' top performance.

- To implement change in energy policy through wind power stations with longer rotor blades and in extreme locations
- To save fuel on land, at sea and in the air
- For sports equipment that is simply more fun – even under extreme conditions
- And for much more



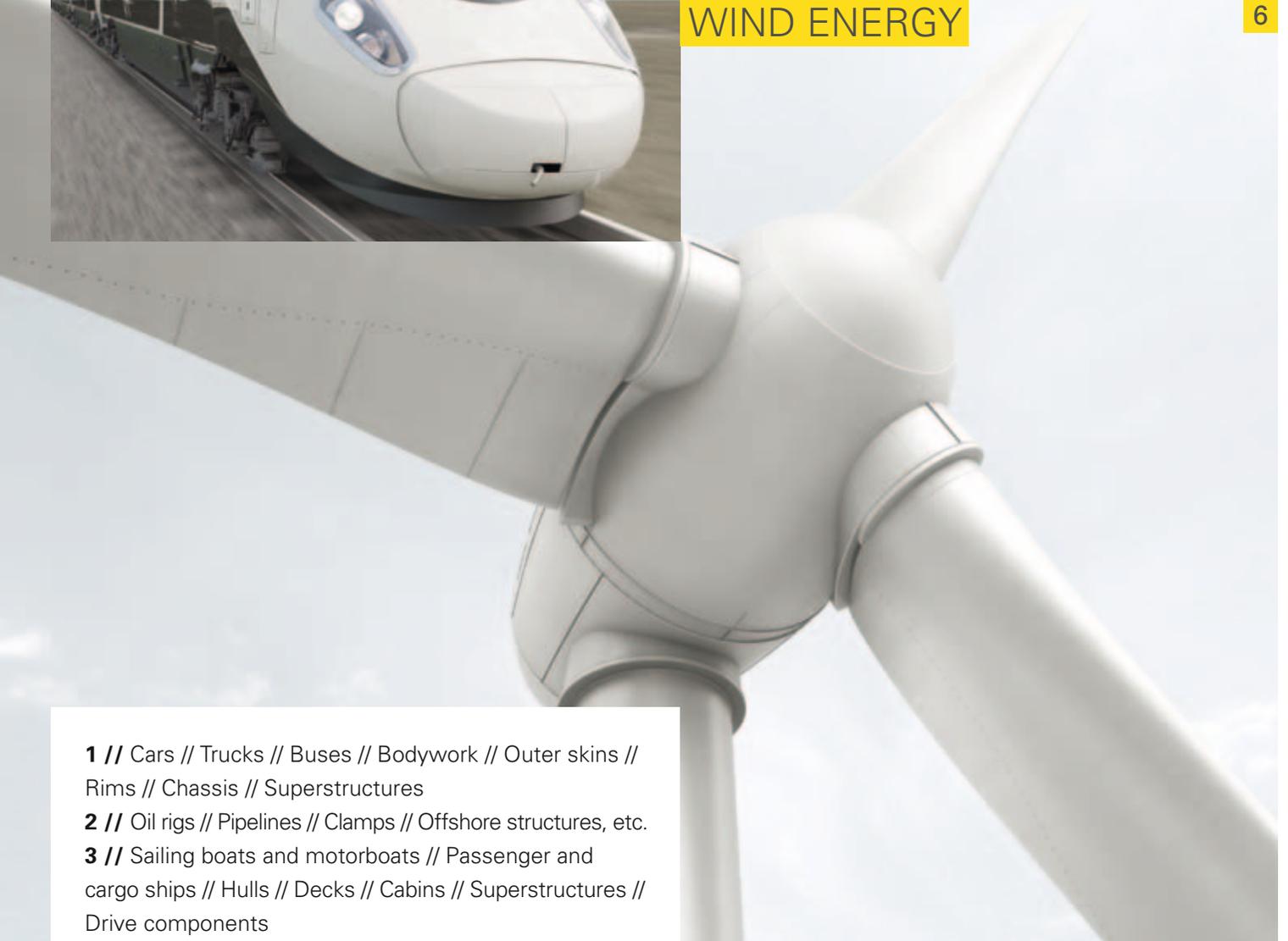
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RAILWAY



WIND ENERGY

6



1 // Cars // Trucks // Buses // Bodywork // Outer skins // Rims // Chassis // Superstructures

2 // Oil rigs // Pipelines // Clamps // Offshore structures, etc.

3 // Sailing boats and motorboats // Passenger and cargo ships // Hulls // Decks // Cabins // Superstructures // Drive components

4 // Airplanes // Helicopters // Space travel // Frames // Cover panels // Pressure bulkheads // Wings

5 // Railway vehicles // Train compartments // Interiors // Passenger seats // Structural parts

6 // Rotor blades // Nacelles // Straps // Crosspieces // Shells // Blade connections

7 // Snowboards // Skis // Mountain bikes // Archery bows

7



RECREATION

AND MUCH MORE

IS POSSIBLE:

ANYTHING YOU CAN IMAGINE

A COMPLETE SOLUTION FOR ADDED VALUE

Successful teamwork, from the idea to serial production

Only when everything interacts perfectly is a solution perfect. This is why we, together with our customers, have developed an individualised solution system which takes all relevant success factors into account.

The basis for this is our wide range of **SAERTEX** products. With our extensive offering of possible solutions, we can develop the ideal material for you to realise your ideas.

The product solution in question is supplemented by a comprehensive range of **SAERTEX** services for every phase of your development and production process. We can support you with individual advice and competent services, according to your wishes.



THE SAERTEX® SOLUTION SYSTEM

Multiaxial fabrics: Glass / Carbon / Aramid / Hybrid
Special function materials: SAERcore / SAERflow / SAERfix / 3D Fabrics
Core material for sandwich structures: SAERfoam
Fire protection materials for fibre composite materials: SAERTEX LEO

SAERTEX® MATERIALS "TAILOR-MADE"

Individually configured for you
 Optimised for your components
 Optimised for your overall process



SAERTEX® SERVICES "ON DEMAND"

Freely defined according to your needs
 Optimised for your process
 Geared toward your objectives

Support for
 • Design
 • Calculation

• Choice of material
 • Material development
 • Draping experiments

• Advisory service
 • Logistics concepts
 • Preforming

• Prototyping
 • Laboratory testing
 • Training

• Individual cutting
 • Component production service
 • On-site support



YOUR VALUE-ADDED PROCESS

How to achieve your objectives

- Improvement in component quality and durability
- Simpler, leaner production processes
- Smooth, reliable workflows
- Supply and timing reliability
- Optimisation of overall costs
- Safeguarding of traceability and warranty

THE SAERTEX® MATERIALS – AN INTEGRATED HEAD START IN ENGINEERING

For over 30 years, we have devoted ourselves to meeting the high standards of our customers with our materials. The result:

- Over 2,500 different materials, tailor-made with regard to type of fibre, weight, width, layer structure and stitching.
- Clever special-function products which optimise not only the final component, but the production process as well.
- A comprehensive product system with solutions for monolithic and sandwich design, with our core structural material SAERfoam.
- A unique material system that combines maximum fire protection with optimum mechanical parameters: SAERTEX LEO.

1

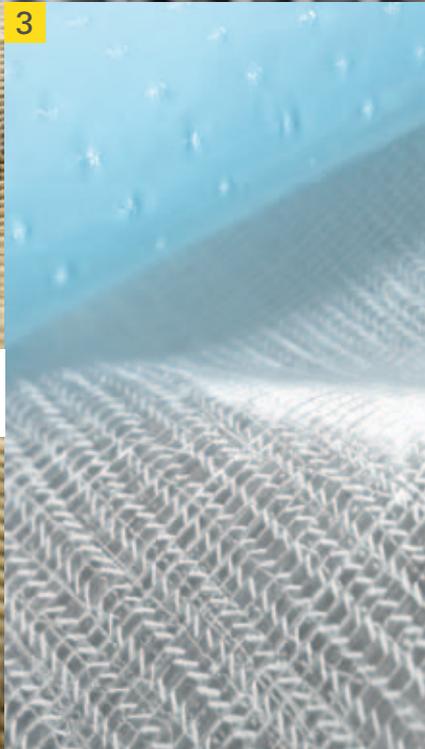
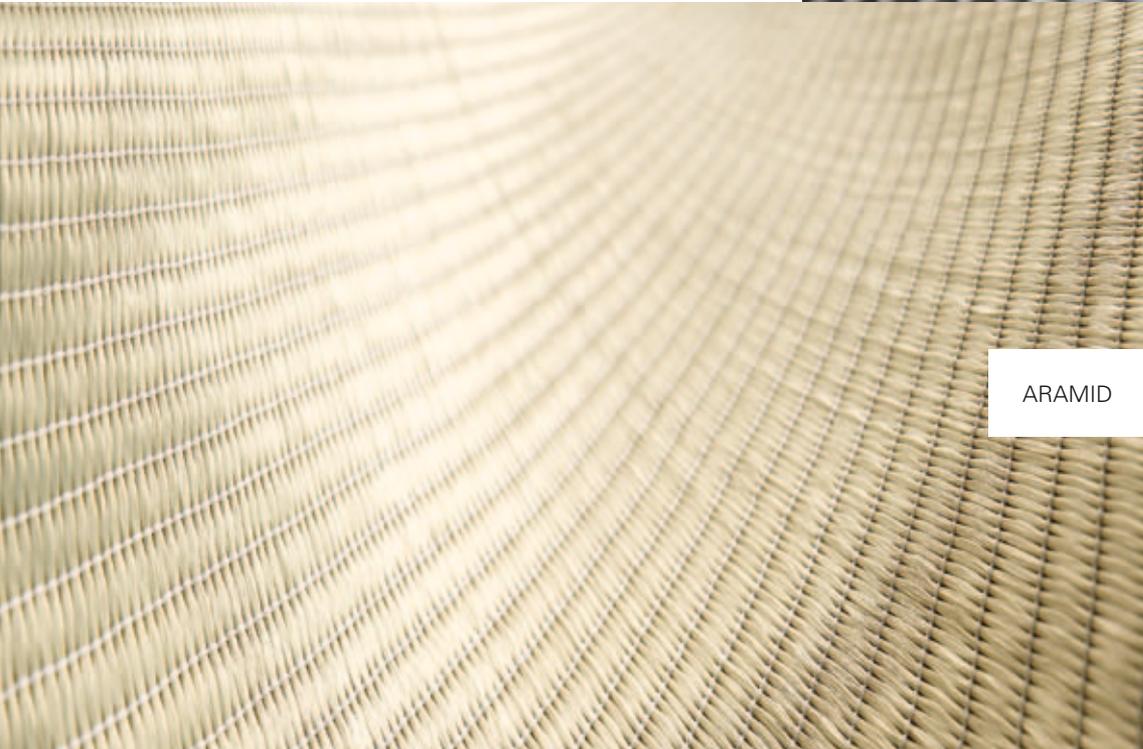


CARBON



3

ARAMID





GLASS

Multiaxial fabrics in glass, carbon, aramid

Multiaxial fabrics

- Glass, carbon, aramid, hybrid
- UD, Biax, Triax, Quadrax, CSM
- More than 2,500 customer-specific articles

Special function materials for optimised processes

1 // SAERcore®: closed mould fabrics

Material with flow enhancing core for (RTM, etc.) closed processes // As SAERcore Max with multiaxial reinforcement // HighFlow version with top impregnation behaviour

2 // SAERflow®: for vacuum infusion

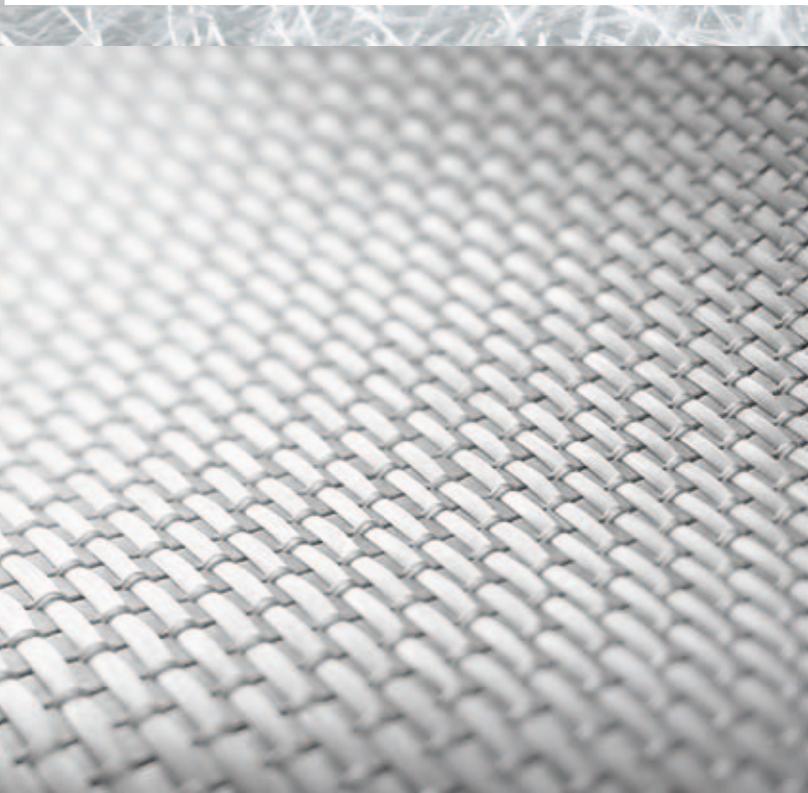
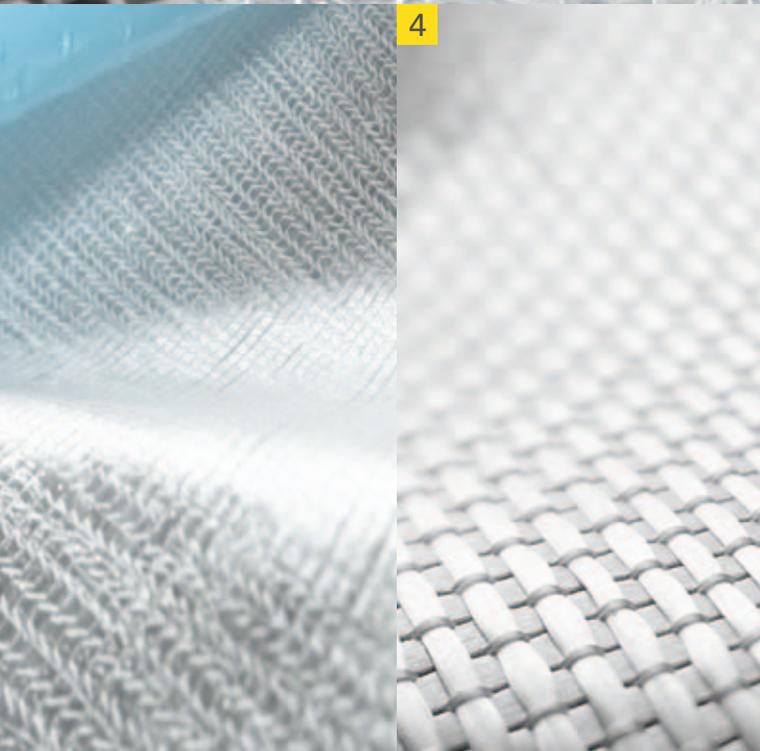
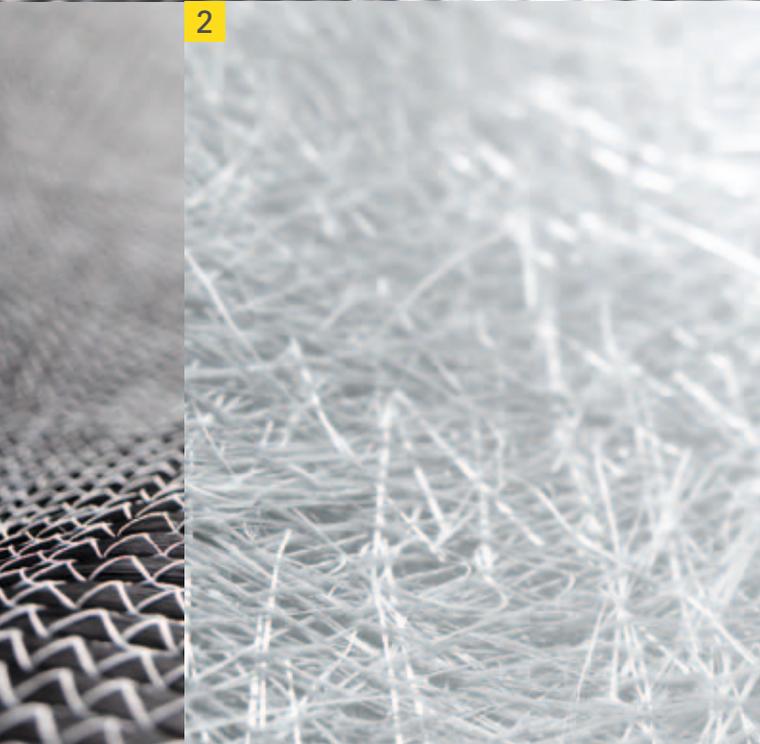
Flow enhancer // Allows optimum impregnation // Supplied without covering layer

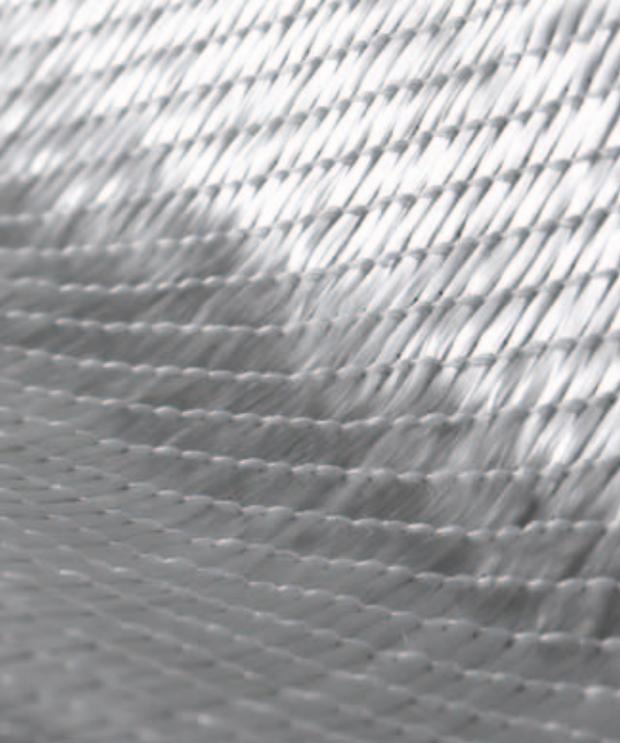
3 // SAERfix®: for self-adhesive reinforcement

SAERfix EP or UP resin-compatible adhesive // As roll stock or as self-adhesive fabric // Saves spraying with vertical moulds

4 // 3D Fabrics: reinforced with Z fibres

0°/90° mat with additional fibres in the Z direction // High mechanical load-bearing capacity and fast impregnation // Outstanding alternative for thick components





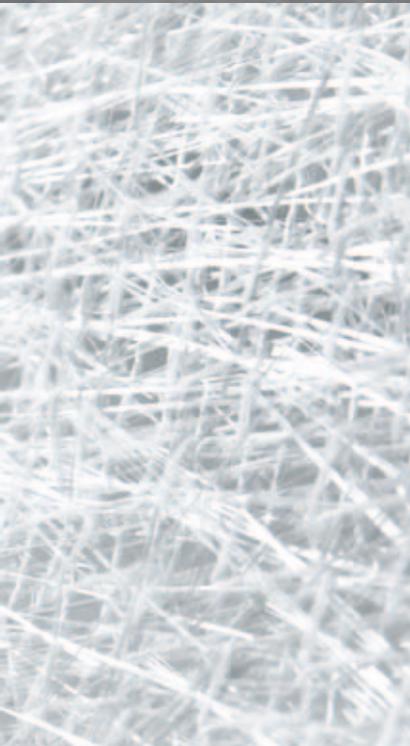
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Core material for sandwich structures

5 // SAERfoam®: engineer your core for strength

Foam material with 3D glass bridges // Engineering-capable core reinforcements // Replaces PVC and balsa wood



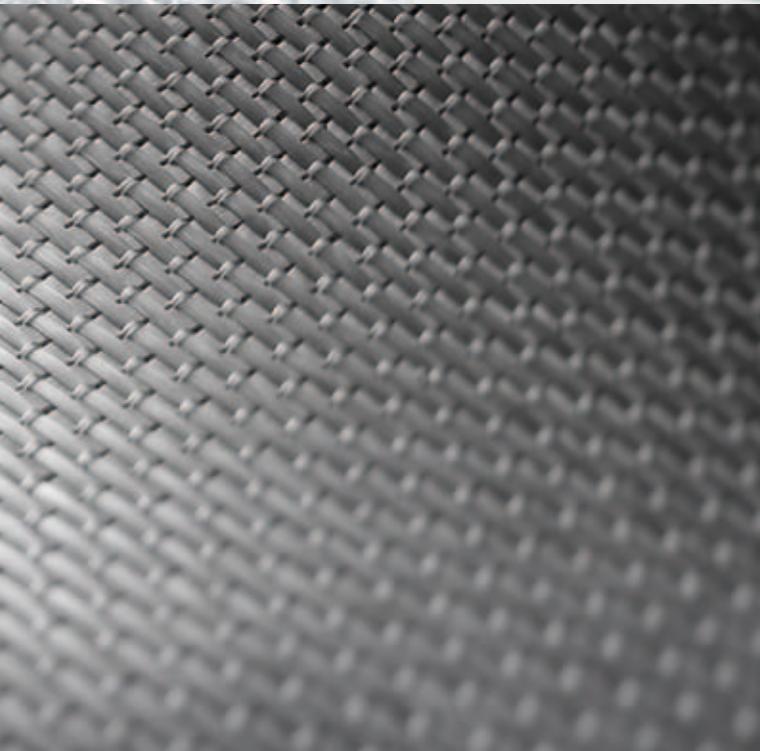
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Fire protection materials for fibre composite materials

6 // SAERTEX LEO®: Lightweight with Extreme Opportunities

System consisting of mats, core material, resin and gel or top coat // Combines safety with top mechanical load values // Complies with EN 45545 in trains and the IMO FTP test in shipbuilding



THE **SAERTEX**® SERVICES – ADDED VALUE THROUGHOUT YOUR PROCESS

We support your process so that it is ideal for you

You can choose to make the most of **SAERTEX** services whenever it is advantageous for you. For instance, in the event of production bottlenecks, for your cost benefit or simply because you would like to use our technology.

According to your needs, we can carry out prototyping and laboratory tests, cut materials to fit your needs or supply complete systems. On request, we can carry out the serial production of entire components using different manufacturing processes such as RTM and infusion. We can process not only our fabrics, but also preregs.

Engineering Support

- Support in design and calculation services
- CAD data service

Preforming

- Powdering of mats
- Stitching preforms

Laboratory tests

- GL-certified for non-metallic materials
- Static and dynamic tests: tensile load, compression load, shear load, bending load, ILSS, material fatigue, fibre content, draping capability

Cutting & Kitting

- Individualized cutting
- Packaging concepts
- Nesting service

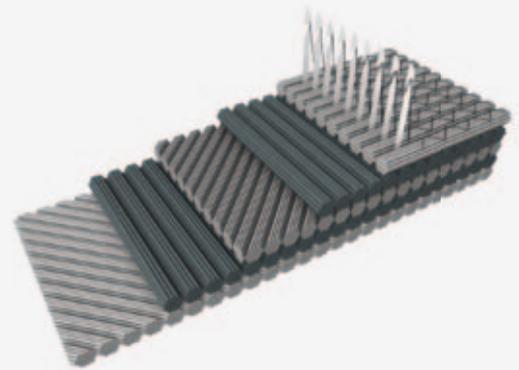
Component production services

- Prototyping and serial production
- RTM, RTM light, vacuum infusion
- 8,500 m² fully air-conditioned production facility in Stade
- For offshore, shipbuilding, transportation and many more



Pioneers in NCF technology

In 1982, the year of its establishment, **SAERTEX** began working with the idea of producing reinforced surfaces as stitched mats, so-called non-crimp fabrics. Unlike woven fabrics, the mat includes the stretched form of its input fibres. Since glass, carbon and aramid fibres only retain their outstanding properties in the longitudinal direction of the fibre, they are perfectly suited to the mechanical load of the application through a layer structure. In this process, the individual layers are placed in different directions and, at the same time, stitched to each other.



The advantages of NCF:

- The fibres, weights and orientation of the layers are freely definable
- Stretched fibres for optimum load-bearing capacity
- Cost savings through fewer layers

SAERfoam®

The idea: a foam core, reinforced by 3D glass bridges for the production of innovative, cost-effective sandwich laminates.

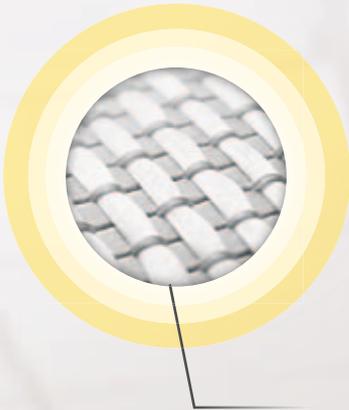
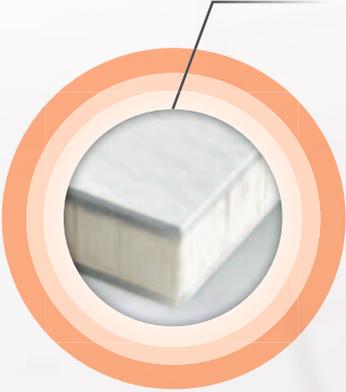
The innovation: SAERfoam



SAERTEX LEO®

The idea: a product system consisting of a mat, resin and a special protective layer which ensures extreme fire protection alongside convincing composite advantages.

The innovation: SAERTEX LEO



3D Fabrics

The idea: a fabric with reinforcing fibres in the Z direction which sets new standards in terms of robustness and processing efficiency.

The innovation: 3D Fabrics

INNOVATIONS FOR TOP PERFORMANCE

We are engineers at heart, and work consistently to promote the improvement and the efficiency of composite solutions. We rely on the latest engineering techniques and technologies throughout the entire process. To increase our innovative potential, we actively promote the exchange of ideas with our partners in the fields of science and research, our suppliers and, of course, our customers.

Innovation at **SAERTEX** is fostered through the interaction of 3 factors:

■ **We love challenges.**

Our customers' new requirements and the experience gained in thousands of individual projects drive us forward.

■ **We combine our knowledge.**

The cross-linked competence and technological skills of our employees and partners create the ideal basis for innovation – for us and for our customers.

■ **We are passionately committed.**

Implement new ideas and develop better solutions – this is what we endeavour to do, day in and day out.

As a result, new products that pioneer the industry are created on the premises of **SAERTEX**.

JEC Innovation Award for **SAERTEX**® and its partners:

The MAPRETEC 2014 project received this award for its contribution to the automated production of rotor blades for wind power stations. With the help of adapted multiaxial fabrics (NCFs), they can be designed faster and at reasonable cost. MAPRETEC was founded in cooperation by BIK (University of Bremen), AREVA Blades and **SAERTEX**.

SUCCESS IS TEAMWORK

Accomplishing more together

We at **SAERTEX** are visionaries in action. We consider ourselves teammates for our customers, developing new strategies together and completing projects purposefully, as we find cooperation is most enjoyable when it leads to success. To achieve this, we provide top-quality work.

Achieving all that is possible

Efficient lines of communication and quick decisions are part of our corporate culture. At the same time, we are open to new solutions. We can offer a high degree of flexibility to fulfil almost every wish, in addition to straightforward answers if things do not work out as expected.

Thinking about tomorrow

We take a forward-thinking approach in all that we do, working proactively to ensure projects are successfully completed. We also focus our energy on new developments so we may continue to lead the way for innovative composite solutions tomorrow.

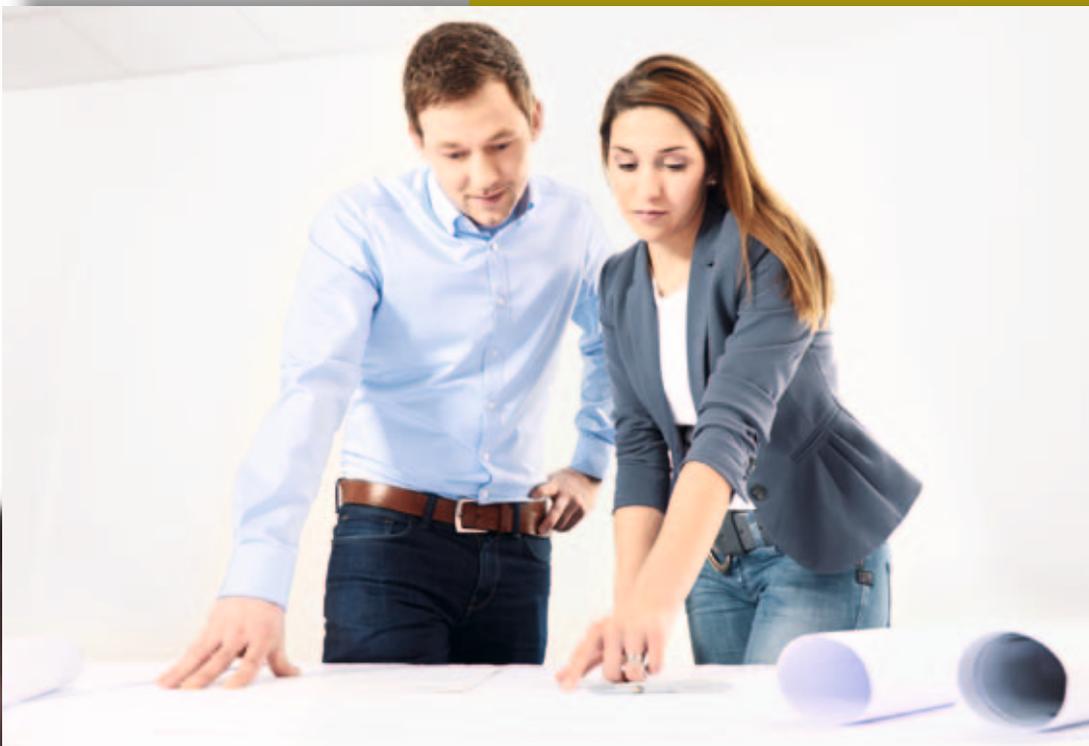
Building partnerships with trust

As a family-owned business, we attach great importance to long-term partnerships and personal relationships with our customers. We are true to our word, and rely on fairness, trust and reliability in all situations.



**“People say that we’re different.
And we want to be different.
Because we support our customers
and help them to become better
because we are different.”**

Bruno Lammers, CEO and Managing Partner



GLOBAL COMMITMENT ON YOUR BEHALF

We believe proximity to our customers is important. We want to be there for our partners, ready to help them when they need us. This is why we are represented with engineering and production facilities in 8 countries on 5 continents, and offer a service network in over 50 countries worldwide.



SERVICE AND ADVICE

Australia, Belgium, Bosnia and Herzegovina, Brazil, China, Denmark, Germany, Estonia, Finland, France, Greece, Great Britain, Hong Kong, India, Israel, Italy, Japan, Canada, Korea, Croatia, Latvia, Lithuania, Macedonia, Montenegro, Netherlands, Norway, Austria, Poland, Portugal, Romania, Russia, Sweden, Switzerland, Serbia, Slovakia, Slovenia, Spain, South Africa, Taiwan, Thailand, Czech Republic, Turkey, Ukraine, Hungary, USA, UAE