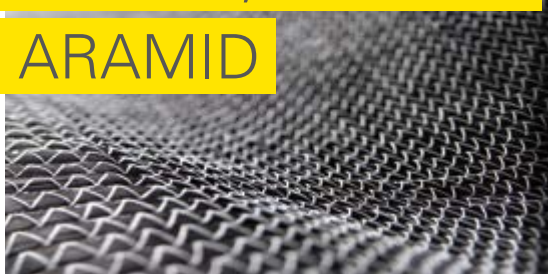




REINFORCING YOUR IDEAS

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



Klaus Lammers, Bruno Lammers and Simon Lammers (Chairmen)

A family-owned business, at your service worldwide

- Established in Saerbeck, Germany in 1982
- 14 locations in 10 countries on 5 continents
- 50 countries with customer service
- 2,500 customer-specific product solutions
- 1,400 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 bridges, facade elements, wall or ceiling elements
- For sports equipment that is simply more fun – even under extreme conditions
- And for much more

1

AUTOMOBILE



4



AVIATION

2

CONSTRUCTION



3



BOAT AND SHIPBUILDING

5

RAILWAY



WIND ENERGY

6



7



SPORTS INDUSTRY

- 1 //** Cars // Trucks // Buses // Bodywork // Outer skins // Rims // Chassis // Superstructures
- 2 //** Bridges // Facade elements // Wall or ceiling elements // 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

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
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

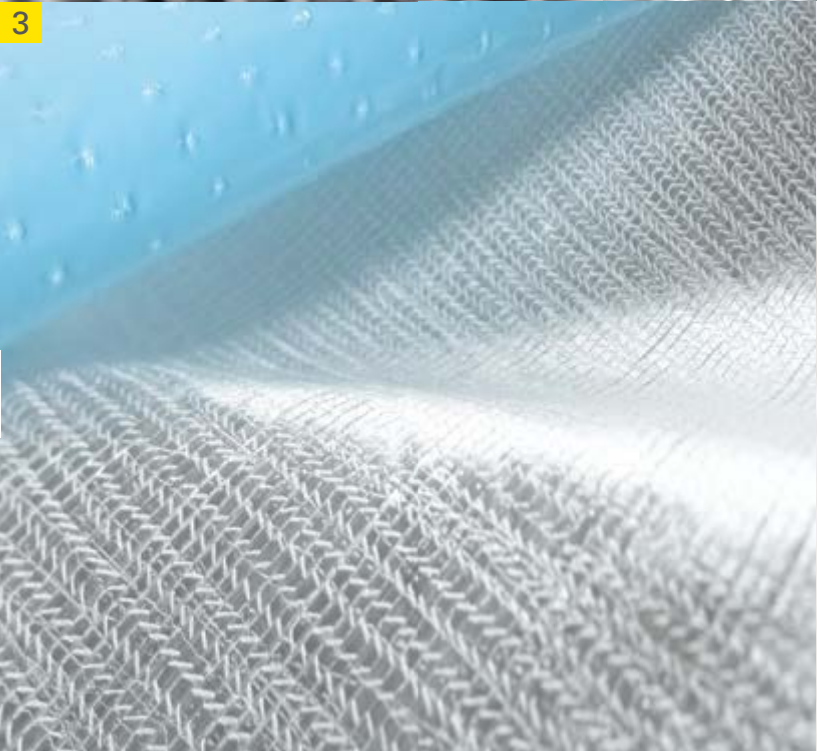
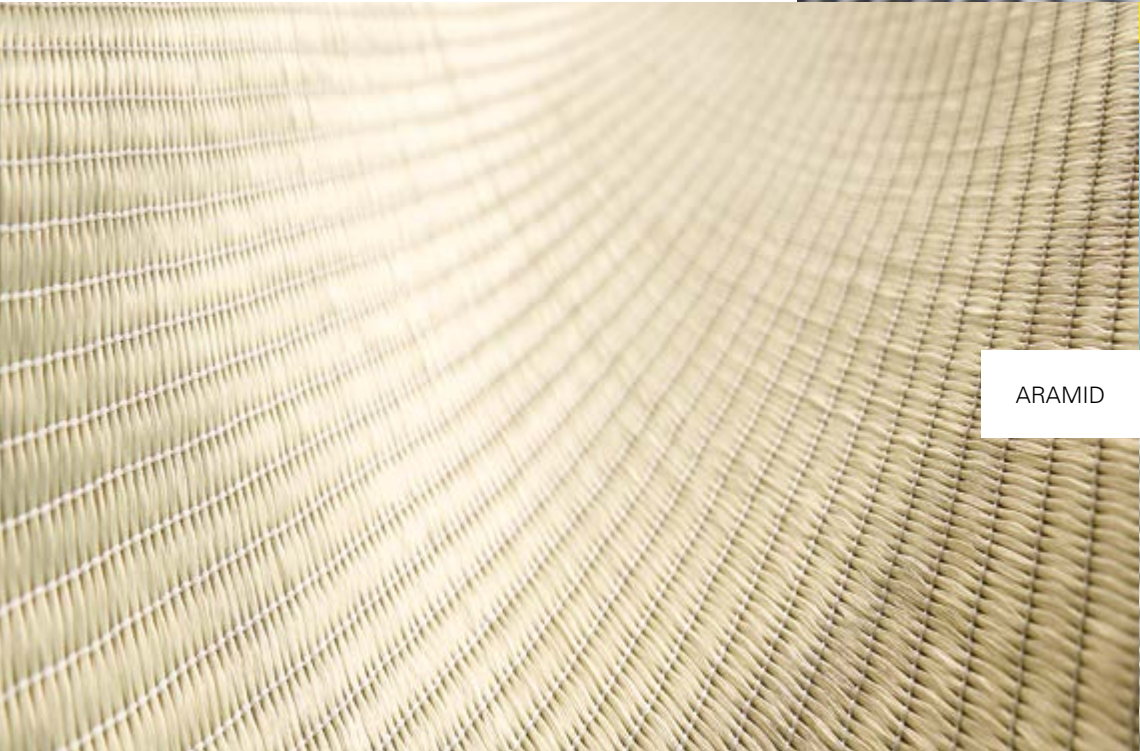
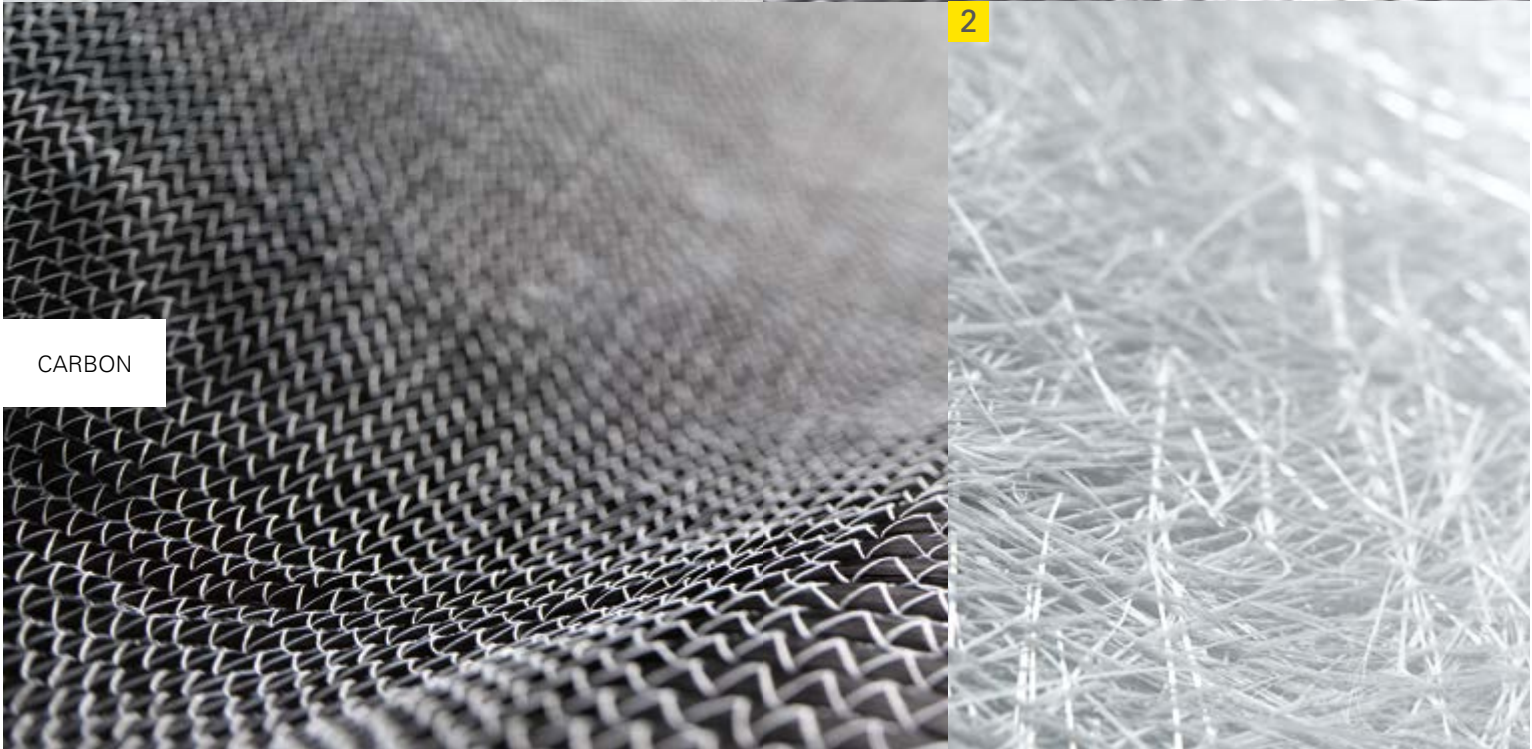
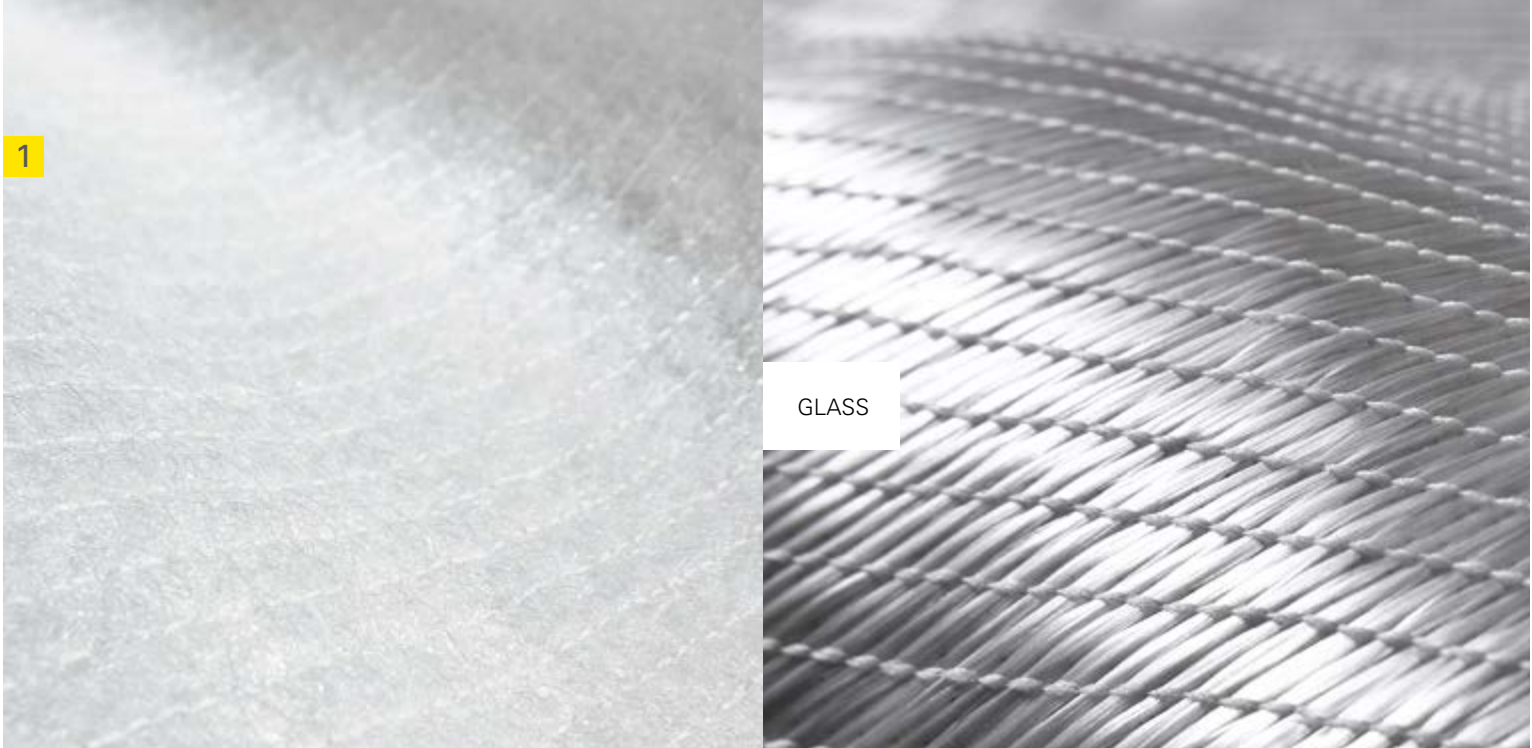
How to achieve your objectives

- 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 INTE- GRATED 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.



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

Core material for sandwich structures

4 // SAERfoam®: engineer your core for strength

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

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 prepregs.

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



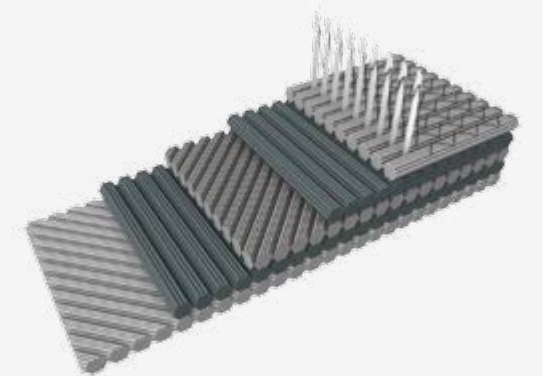
Fire protection materials for fibre composite materials

5 // 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 // DIN SPEC 91326 compliant

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

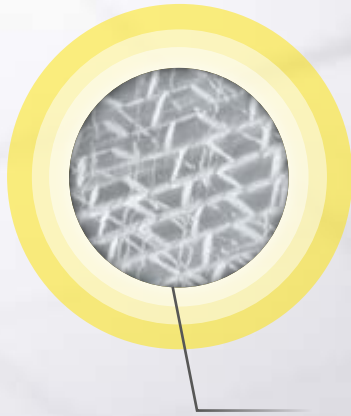
SAERfoam®

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



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.



SAERfix®

The idea: an adhesive in roll form for application by the user, or in combination with SAERTEX multi-axial fabrics as a self-adhesive NCF system.

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**.

„Vision of the Fjords, Ship of the Year 2016 in Norway”: Brødrene Aa and SAERTEX® win the JEC Innovation Award 2017.

The sightseeing ship from Brødrene Aa, which was built recently using **SAERTEX** carbon fibres, is visionary in many respects. The hull and superstructures consist largely of carbon parts. The resulting weight savings of nearly 50 per cent made the practical use of a hybrid drive possible, leading to a reduction in emission values of more than 20 per cent.

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 10 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, Mexico, 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