SIGRACOMP® Components Made from Carbon Fiber – Reinforced Plastic
Carbon fibers and composites – made by SGL Group.

- Comprehensive product range
- Integrated value chain
- Only European carbon fiber manufacturer
- Consistently high quality
- Many different processing technologies
- Innovative tailored solutions
- High security of supply
- Close-to-customer sales and distribution network
- Global presence
Unique integrated value chain

SGL Group covers the complete value chain of carbon fiber products: from precursor via carbon fibers, fabrics, and preregs to the finished CFRP components. Our carbon fibers produced by SGL Group in Europe and North America form the basis for all processing steps in fiber-reinforced composite applications.

Carbon fiber-reinforced plastics are high-performance materials with unique properties. They are used where other materials have reached their limits and are indispensable in many industries today, e.g. for lightweight components with ultra-high strength and stiffness.

SGL Group is the only European manufacturer to cover the entire carbon fiber value chain: from raw material we produce ourselves via all intermediate steps to the finished end products. In this way, we can guarantee the highest product quality and security of supply.

With many different processing technologies and comprehensive production, material, and application know-how, we can offer our customers tailor-made solutions for their requirements – for example in automotive production, the wind energy sector, and numerous other industrial applications.

SIGRACOMP® components made from carbon fiber-reinforced plastic (CFRP)

In challenging high-tech applications requiring high strength and stiffness combined with light weight, SIGRACOMP CFRP components are irreplaceable. CFRP is lighter than aluminum or steel and is also enormously durable. The material is used in many industries from medical technology and mechanical engineering through robotics and automation technology to measuring technology and optics.

Video: From fiber to finished component

Winding of a component made from carbon fiber-reinforced plastic
SIGRACOMP® components made from carbon fiber-reinforced plastic

The ideal material for lightweight construction

Our SIGRACOMP CFRP components have excellent mechanical properties combined with light weight. As a result, they are used in many different industries.

Carbon fiber-reinforced plastic – the ideal material for lightweight construction

- Light weight
- High strength and stiffness
- Excellent fatigue strength
- Good vibration damping
- X-ray transparency
- High chemical resistance
- Low thermal expansion
- Corrosion resistance

Carbon fiber-reinforced plastics are materials consisting of several components: a base or carrier substance, known as the matrix, and a second reinforcing component, the carbon fiber, which is embedded in the matrix. This combination results in high-performance materials with exceptional properties.

The different production technologies for CFRP components:
- Prepreg compression molding
- Autoclave technology (vacuum bag process)
- Winding methods
- Lamination
- Blowing methods
- Preform production (aerospace)
- Resin transfer molding (RTM)

Production process

- Carbon fiber textile
- Resin
- Lamination
- Compression molding and curing
- Winding
- Curing in a pressure vessel
- Machining
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<td>Biocompatibility declaration</td>
<td>High vibration damping</td>
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<td>Approval as implant material</td>
<td>Excellent fatigue strength</td>
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<td>Clean room manufacture of components</td>
<td>High acceleration and speed possible</td>
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<th><strong>Measuring technology and optics</strong></th>
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<td>Typical products</td>
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<td>Rapiers</td>
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<tr>
<td>Low thermal expansion (adjustable to negative range)</td>
<td>Low intrinsic weight</td>
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<td>Low intrinsic weight</td>
<td>Excellent fatigue strength</td>
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<td>High measuring accuracy</td>
<td>Higher output</td>
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<td>Dimensional stability</td>
<td>Lower energy consumption</td>
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<td>Positional accuracy</td>
<td>Good chemical resistance</td>
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Carbon fiber-reinforced plastic – combination of special properties

By using different matrix materials and fiber types, the properties of CFRP can be varied. This enables them to be optimally tailored to component requirements.

With their low density, CFRP composites are supreme in terms of specific tensile strength. They outperform glass fiber-reinforced plastic (GRP), aluminum, and even high tensile steel. For this reason, CFRP materials dominate modern lightweight construction in high-stress applications.

![Tensile strength testing of carbon fibers](image)

Properties of different construction materials as compared with CFRP

<table>
<thead>
<tr>
<th>Material</th>
<th>Density [g/cm³]</th>
<th>Tensile strength [N/mm²]</th>
<th>Specific tensile strength [N/mm² / g/cm³]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pine wood</td>
<td>0.5</td>
<td>1200</td>
<td>2400</td>
</tr>
<tr>
<td>CFRP</td>
<td>1.5</td>
<td>1700</td>
<td>1133</td>
</tr>
<tr>
<td>GFRP</td>
<td>1.8</td>
<td>1600</td>
<td>944</td>
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<tr>
<td>Aluminum alloys</td>
<td>2.7</td>
<td>800</td>
<td>296</td>
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<tr>
<td>Steel</td>
<td>7.8</td>
<td>400</td>
<td>51.9</td>
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</tbody>
</table>

* Fiber orientation 0°/+45° = 1/1
Commercial carbon fibers today can be classified into two basic groups: high tensile fibers (HT) and ultrahigh modulus fibers (UHM). HT fibers cover 80% of the market.

Fiber-reinforced composites are anisotropic, i.e. their properties differ according to fiber orientation. Their physical properties, such as elastic modulus or strength, vary as a function of the fiber orientation angle.

The thermal expansion coefficient of SIGRACOMP CFRP components can be adjusted within a certain range, making it possible to achieve very low or even negative thermal expansion coefficients. This is important for optical precision instruments but also for all other components that have to be dimensionally stable.
Comprehensive product service for your solutions

- Design and construction
- Component development in close consultation with the customer
- 3D drafting (Solid Edge)
- Calculation using modern FEM
Complete solutions – from the initial concept to serial production

SGL Group stands for leading-edge know-how and know-why in material selection, engineering, application technology, and production methods for SIGRACOMP components made from carbon fiber-reinforced plastic. This headstart in expertise and quality pays off for our customers.

We advise and support you in planning and realizing the optimum application of composite-based solutions.

New application ideas are developed in close consultation with the customer. We discuss the available range of materials and select the most suitable for the particular requirements of the customer. The installation space necessary for the intended part and the loads to which it will be subjected are defined to establish a framework for component design. Then, we provide a decision-making basis for our customers by developing specific construction methods with the aid of 3D drawings and modern FEM calculation for the particular material used.

All project phases are carried out in close consultation with the customer. Parallel with product development, the relevant production process is also determined. Besides process simulation, industrialization of the relevant production processes can be undertaken. Prototypes or pilot series can be produced on request.

Competent partner in the development of innovative material systems

Through their increasing use in large-scale manufacture in combination with conventional materials such as steel and aluminum, composites are finding their way into ever more specialized applications. With our know-how and broad material base, we can develop the optimum solution for your application.

Quality management is a continuous process

We want to understand and fulfill the requirements of our customers. To achieve this, we work continuously on improving our products and processes:

- Quality assurance during all stages of production and final inspection
- Mechanical and static testing of CFRP components
- QM system certified under DIN EN ISO 9001
A comprehensive range of application-optimized, high-performance solutions.

To develop new ideas, you need partners who can contribute added knowledge and think outside the box. As the only European carbon fiber manufacturer, we offer more than just our comprehensive product portfolio.

With our many different processing technologies, we supply solutions perfectly matched to your requirements, application, and technical conditions: precisely tailored high-performance materials for the development and production of competitive lightweight design innovations.
A leading global manufacturer of carbon-based products.

- Unique product portfolio
- Innovative technologies and solutions
- Production sites close to sales markets
- Technology & Innovation Center in Germany with international networks

We have wide-ranging expertise in raw materials, advanced manufacturing processes, and long-standing application and engineering know-how. We have a comprehensive portfolio of carbon, graphite, and carbon fiber products and our integrated value chain covers everything from carbon fiber to composites. With a global sales and distribution network and modern production sites in Europe, North America, and Asia, we are close to our customers throughout the world.

We use this broad base to offer our customers the best solutions possible. That’s how we live up to our claim: Broad Base. Best Solutions. This claim is also upheld by our corporate SGL Excellence philosophy of continuous improvement.

More Information can be found by visiting:
www.sglgroup.com
sglgroup
YouTube sglgroup
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