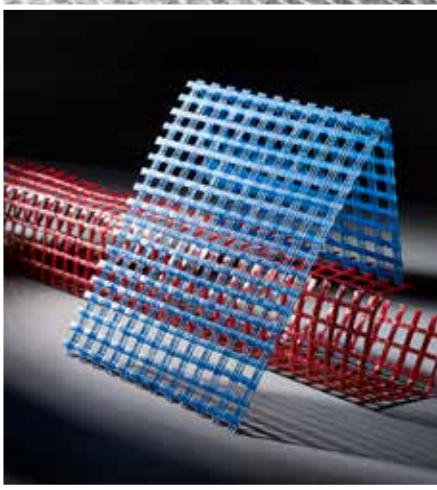
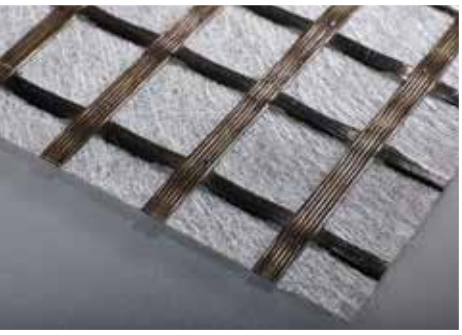
THE SOLUTION FOR SPECIFIC REQUIREMENTS

TECHNICAL FABRICS





A POWERFUL HISTORY

As the famous German writer Hermann Hesse said: "And a magic dwells in each beginning." Whether the history of Vitrulan has been "magical" or not is something everyone is free to decide for themselves, but one thing is undeniable: it has been **innovative.**

What began at the end of the 19th century in Haselbach, Thuringia, with the founding of a glass factory for the production of glass tubes and marbles is today a group of internationally operating companies.

STILL FAITHFUL TO GLASS AS A RAW MATERIAL

The growing demands of the markets have in the meantime led to the addition of a variety of other materials such as carbon, polyester, and aramid to the production range. Nevertheless, Vitrulan has remained faithful to glass as the raw material for a large number of its products.

VITRULAN FOR YOU

Today, the Vitrulan Group consists of six companies and has production facilities at four locations. Besides the headquarters in Marktschorgast near Kulmbach, production sites are also based in Haselbach (Sonneberg district) and Brattendorf (Hildburghausen district) in Germany. A fourth production facility is located in Mikkeli, Finland.

Aesthetic and functional glass fiber wall coverings, technical textiles, and modern infrared surface heating make up the core range of the Vitrulan Group.

Vitrulan Holding GmbH
Vitrulan Textile Glass GmbH
V4heat GmbH
Marktschorgast, Germany

Vitrulan Technical Textiles GmbH
Haselbach, Germany

Vitrulan Composites Oy
Mikkeli, Finland

STRONG IN EVERY CONFIGURATION

MULTIAXIAL NON-CRIMP FABRICS

What if a component is exposed to constant forces from different directions? Generally speaking, a product with a particularly high absorption capacity could be used here; one that equally buffers all forces acting on it, ranging from strong to weak. However, this would require an unnecessarily large amount of material, which would in turn negatively affect overall weight and material costs.

A DIFFERENT STORY WITH MULTIAXIAL NON-CRIMP FABRICS

The various fiber **alignment options** available achieve **load-specific force absorption** in the desired directions. Consequently, only the material required is used while the total weight is kept as low as possible. As a result, **fewer reinforcement layers are needed**, which in turn leads to a **reduction in the amount of work** involved and thus the **overall costs**.

ALIGNMENT OPTIONS

Unidirectional	0° or 90°
Bidirectional	0° and 90°
Biaxial	+/- 45°
Triaxial	0°, +45° and -45° or 90°, +45° and -45°
Quadraxial	0°, +45°, -45° and 90°

Other angle settings possible on request.

DID YOU KNOW?

NCF/fleece or NCF/mat combinations incorporate the mechanical properties of multiaxial non-crimp fabrics with those of other products:

Fleece materials: ensure an even distribution of resin, resulting in a uniform surface appearance.

Mats: are excellent for draping and their thickness makes them particularly efficient to work with.

THE CLASSIC CHOICE FOR REINFORCEMENT

WOVEN MESH FABRICS

Wherever strong forces are at work, choosing the right protection is essential to prevent damage and deterioration in the long term.

Woven mesh fabrics help to increase this protection: Adapted to the respective application, they excel through particularly high strength and stability combined with perfect flatness. This makes them not only very easy and efficient to work with, but also ensures a long service life.

During renovation or new build, interior and exterior walls are often exposed to great loads, which at worst damage the masonry: **cracks form**. When installed into the respective plaster/render system, woven mesh fabrics provide reliable and long-lasting reinforcement thanks to their high **tensile strength** and **flexibility**.

Filtration systems – or more precisely, the filter media used there – are also exposed to continuous and constantly fluctuating pressure forces or temperature fluctuations. In order to provide the filters with the necessary **stability** and **strength**, woven mesh fabrics are installed as support and protective fabrics.

Perfect for interior and exterior plaster/render systems...

...as well as wet and particle filter media.

THE HIGHLIGHT:
Depending on the requirements and application, a variety of finishing options are available for woven mesh fabrics. For example, a self-adhesive finish or a non-combustible coating are possible.

FROM LIGHTWEIGHT AND OPEN-MESH TO HEAVY-DUTY AND ROBUST

SCRIMS

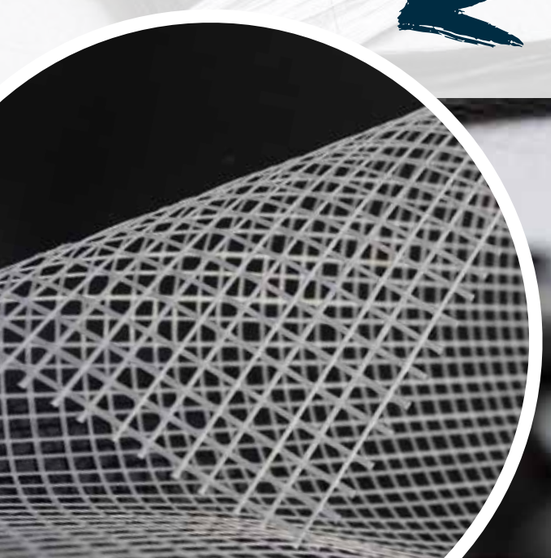
Scrims are produced by **laying** individual threads on top of each other and then bonding them with a binder system. Vitrulan distinguishes between two types:

HEAVY-DUTY SCRIMS

consist of roving material which can be manufactured from various fibers such as carbon, polyester or hybrids. They provide **strength** in the finished component. What is more, they significantly increase **force absorption**, as the fiber axes can be individually aligned to the forces that will subsequently be exerted.

LIGHTWEIGHT SCRIMS

in contrast, are made of polyester or glass fibers in 0°/90° orientation. They feature an especially open mesh structure, are flat, and very **lightweight**. At the same time, they offer a high force absorption potential, **excellent flatness**, and are ideal for reinforcing bitumen or synthetic membranes.



MATERIAL VARIETY:
While lightweight scrims are made of glass or polyester fibers, for heavy-duty scrims carbon, polypropylene, polyaramid or hybrids can be used, enhancing the scrim with additional unique properties.

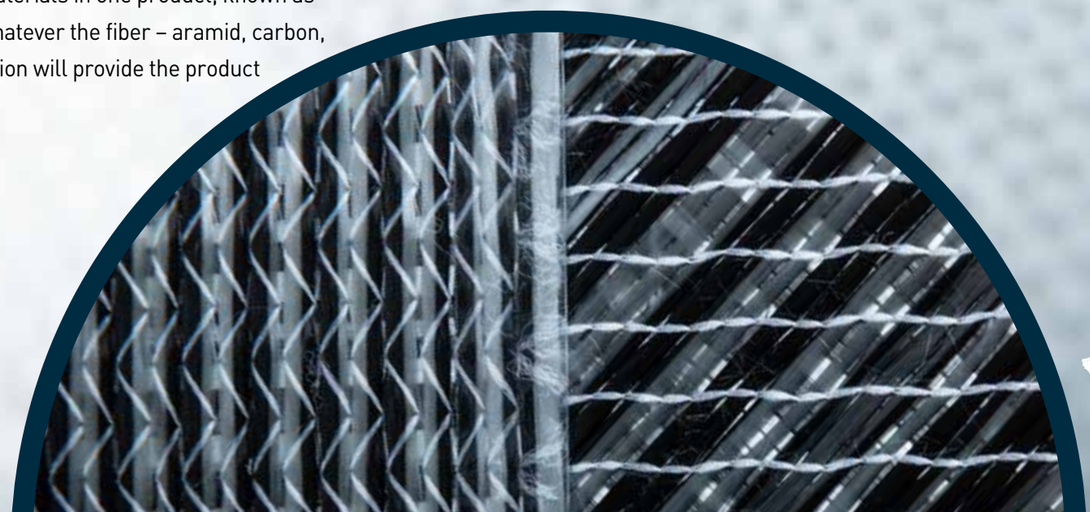
ONLY THE BEST OF EVERYTHING

WOVEN HYBRID FABRICS AND HYBRID NCF

Technical fabrics and scrims already display **excellent technical properties** on account of their structure. By deliberate selection of the fiber material used, the product can be provided with additional properties.

Moreover, it is also possible to incorporate different materials in one product, known as **woven hybrid fabrics** or **hybrid non-crimp fabrics**. Whatever the fiber – aramid, carbon, glass, polyester or polypropylene: a targeted combination will provide the product with the desired properties.

ROBUST YET LIGHTWEIGHT
Hybrid non-crimp fabrics are often used in trains, as they replace several layers of einforcement in one go, thus considerably reducing the overall weight.



Multiaxial glass/carbon hybrid non-crimp fabric

ELASTIC AND EXTREMELY STRONG

KNITTED FABRICS

The special manufacturing process of weft-knit fabrics, or knitted fabrics for short, gives them an **extremely tear resistant** structure.

Yet at the same time, they remain **elastic** enough to fully absorb any mechanical impact and stress that may occur. This makes them ideal for use in roofing and waterproofing membranes.

A STRONG CARRIER

Its high tear and tensile strength makes knitted fabric the perfect substrate material, e.g. for marble and natural stone slabs.

FROM CLASSIC TO INNOVATIVE

TECHNICAL FABRICS

Our extensive machine park makes an enormous range of production processes possible. In addition to conventional roving fabrics, for instance, special technical fabrics can also be developed and produced for individual areas of application.

WOVEN ROVINGS

boast a **uniformly aesthetic surface appearance** and a particularly **high force absorption potential**. The choice of fiber material can also lend the fabric different properties.

Whereas using glass fibers results in a particularly compact and robust product with very low deformability, carbon fibers ensure an exceptionally low weight per unit area as well as a visually appealing surface.

TECHNICAL FABRICS

Customized product solutions are developed for special fields of application. These include **filtration fabrics** for solid and liquid separation, hot gas or particle filtration, as well as **coating carriers** whose specific material properties allow them to be adapted so as to positively influence the technical parameters of the coated surfaces.

WOULD YOU LIKE A LITTLE MORE?

Add a stitchbonded mat and the result is a woven mat combination that is not only extra thick, but also extremely robust.

All in all, fewer filler and reinforcing layers are needed.

DID YOU KNOW?

Carbon fibers are chemically inert and especially resistant to most acids, alkalis, and solvents!

TWO BECOME ONE!

LAMINATES

By uniting two products to form what is known as a laminate, their technical properties can be combined and processing procedures consequently optimized.

BOTH REINFORCING AND SMOOTH

On top of the reinforcing effect, a smooth **homogeneous surface appearance** plays an important role in many areas. This is best achieved by laminating a glass fleece onto a woven mesh fabric or knitted fabric. The smooth glass fleece prevents unevenness, which would have a negative effect on any subsequent structures, without sacrificing the special resilience of the fabric.

FREELY COMBINABLE

Depending on the intended use, the product layers can be freely combined. By connecting two woven mesh fabrics with different mesh sizes, a drainage layer can be created easily.

EXTREMELY SMOOTH
By laminating a fleece onto a fabric, a particularly smooth surface is created, which provides a perfect basis for further structures.

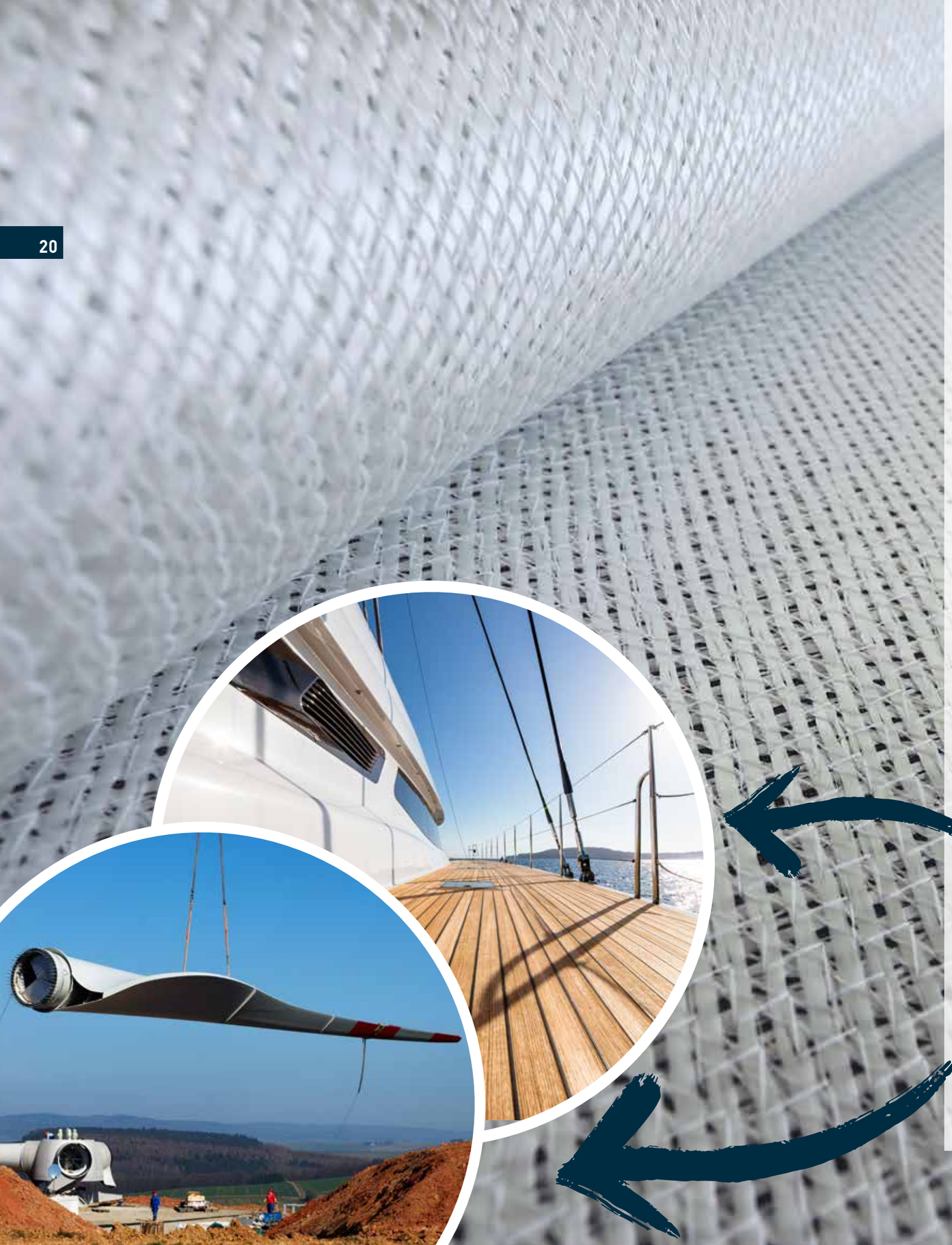
FOR A FAST LAYER BUILD-UP

STITCHBONDED MATS

All companies have to continuously work on optimizing their production processes in order to produce economically and efficiently. Both goal and challenge are always the maximization of time savings.

EFFICIENT AND COST-SAVING

Made from chopped glass fibers that are then stitched together, stitchbonded mats demonstrate good drapability and are extra thick. This not only makes them especially **easy to work with**, but at the same time allows **very thick layers** to be produced in just **one pass**, resulting in significant time savings.



RELIABLE REPRODUCIBILITY AND EXTREME ACCURACY

RESIN FLOW PRODUCTS

Particularly in the production of large components that are manufactured by resin infusion, it is important that the fiber package is wetted quickly without leaving any air bubbles.

THE RIGHT FLOW FOR EVERY SITUATION

Various flow products are available to suit the respective processing method:

- **Combiflow (-D)**
  Chopped fibers are stitched on one or both sides of the flow medium, which ensures good drapability even in complex mold shapes.

- **Multiflow**
  Multiflow products come with single or multi-layer structural reinforcements, enabling them to withstand mechanical stress even better than the Combiflow products.

- **X-Flow**
  The special channel structure of the X-Flow products increases the filling speed and thus achieves faster impregnation of the reinforcing layers.

HighFlow
by Vitrulan

The innovative HighFlow fabrics optimize the resin infusion process and help to produce composites faster and more efficiently. By selecting the right product, the infusion speed can be adjusted perfectly to the component-specific infusion.

RESULT:
A 300–500% faster process speed for the entire composite build-up!

FOR UNIQUE PURPOSES

SPECIAL PRODUCTS

Some products cannot be placed in a specific category because their special properties or processing capabilities are so distinctive. Here are a few examples:

E-SHIELD-FABRIC

Engineered specifically for use in the reinforcement of external insulation and finish systems, the fabric effectively attenuates electromagnetic radiation, especially in the frequency range of mobile phone networks.

SPECIAL FINISHES

Special coatings can optimize the processing properties of selected products or improve their technical parameters.

CORNER BEADS

Depending on requirements, these are available as flexible corner beads with predefined mesh angle, which can be cut to any length, or as preformed corner beads with reinforced angle to protect areas subject to heavy wear and tear.

Woven mesh fabrics with thermoplastic finish can be deep drawn and formed to any shape due to a special coating.

Woven mesh fabrics with a heat-sealable finish bond through the application of heat and surface pressure alone.

WE ASSIST YOU WITH YOUR PROJECT

CUSTOMIZED PRODUCT SOLUTIONS

Quite simply, there is no such thing as a standard product that provides a solution for every challenge. And there is no need for one.

YOUR NEEDS – OUR SOLUTION

Vitrulan **develops** and **produces** unique product solutions **in close cooperation with its customers** by specifically taking into account the requirements of the application in question.

Solid expertise in the areas of research and development combined with the almost limitless possibilities offered by material and product properties provide the essentials for achieving the desired result. The subsequent development process is of course supported by a constant e**xchange of information, test productions** and **trials**.

At the end of all this awaits a **bespoke product solution** tailored to your needs and the intended application.

APPLICATION AREAS

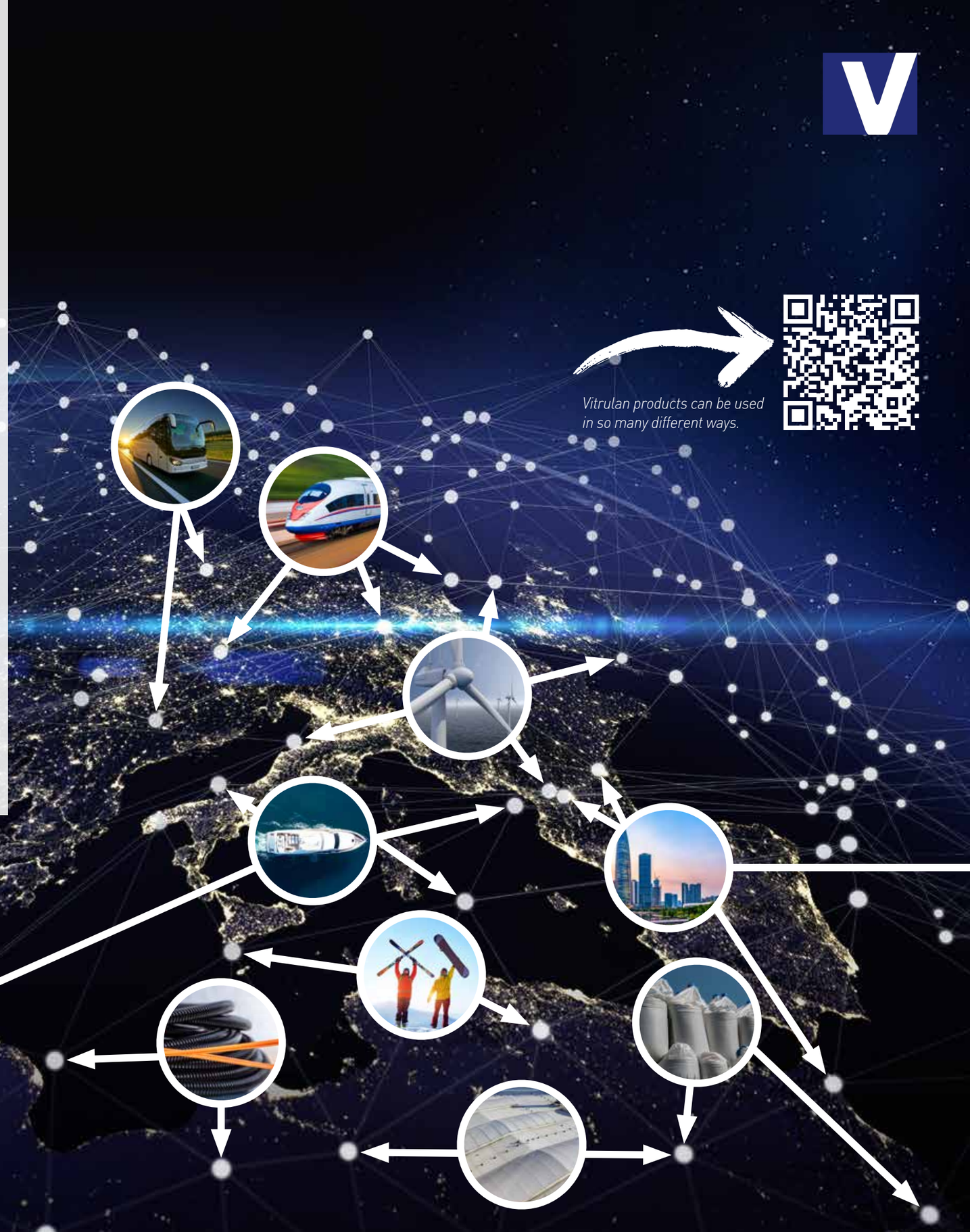
What components make up the things you use or come across every day is not always obvious at first glance. In fact, a lot of everyday objects contain technical textiles.

TECHNICAL TEXTILES AND COMPOSITES IN EVERYDAY LIFE

From the bus we use to get to work or school in the morning and the sleek speedboat that provides excitement and fun on a beach holiday to the wind turbine on a plot of land – these and many other things have one thing in common: they all use technical textiles and composites, some of which are produced by Vitrulan and sold worldwide.

THE RIGHT PRODUCT FOR EVERY AREA

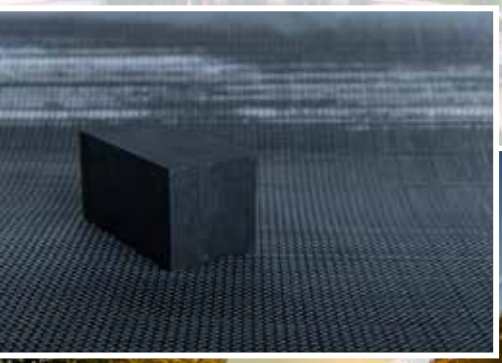
In addition to the **reinforcing effect**, which is important in many areas, the reasons for using technical textiles or composites are extremely diverse: **simpler** and **cost-optimized processing**, the possibility of **weight reduction** for certain components, a particularly **beautiful surface** or **specific material properties** – to name just a few of the numerous options.



The Vitrulan Group has production facilities at three locations in Germany: Marktschorgast (Kulmbach), Haselbach (Sonneberg), and Brattendorf (Hildburghausen); as well as one in Mikkeli, Finland.

Wall coverings made of glass fabrics and glass fleeces, modern infrared surface heating based on glass fabrics, and technical textiles made of glass, synthetic, and carbon fibers make up the core products of the Vitrulan Group.

Vitrulan Technical Textiles and Vitrulan Composites Oy specialize in the manufacture of technical fabrics made of glass, carbon, aramid, and polyester fibers for the construction and composites industries. The fields of application include transport, shipping, wind energy, corrosion protection as well as construction, insulation, and sealing.



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