QUALITY INSPIRES.

Advanced thermoplastic composites

Tepex®

QUALITY WORKS.

LANXESS
Energizing Chemistry

DEFINING LEADING SOLUTIONS IN THERMO-PLASTIC COMPOSITES

Tepex®

Tepex® is a high performance composite laminate system made with thermoplastic polymers. The innovative combination of continuous reinforcing fibers with thermoplastic polymers results in exceptionally high strength and rigidity, coupled with extremely low weight. Tepex® enables cost-effective parts fabrication processes suitable for mass-production, especially in combination with injection molding. Due to its versatility and outstanding property profile, Tepex® addresses the megatrends of our time: green mobility, individual properties and design, enhanced safety and durability as well as sustainable solutions for the protection of resources and the environment. Whenever lightweight design, stiffness and strength, fatigue resistance, energy absorption and functional integration are required in high volume, Tepex® is the material of choice.

BOND LAMINATES
A company of the LANXESS group

Bond-Laminates, based in Brilon, Germany, has more than 20 years experience in development and manufacturing and its application development of thermoplastic composites. The innovative Tepex® material system of Bond-Laminates supports customized solutions from innovative material and parts design to efficient mass production processing and has already been successfully applied in versatile applications and markets. Material development constantly expands the range of materials and properties to address new application areas with tailored solutions.

LANXESS
Energizing Chemistry

Since 2012, Bond-Laminates belongs to LANXESS AG, a leading specialty chemicals company, as a wholly-owned subsidiary. As a part of the High Performance Materials business unit, Bond-Laminates complements LANXESS' competences in the field of innovative lightweight materials. The core business of LANXESS is the development, manufacturing and marketing of plastics, intermediates and specialty chemicals.

Customized thermoplastic composites for mass production

INDIVIDUAL CHARACTERISTICS

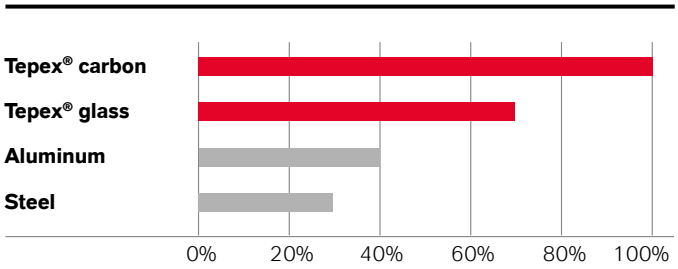
1. Stiffness & Strength

In wood, plants and bones, nature itself has demonstrated that high-strength fibers are the most suitable lightweight materials to transfer and absorb forces. The flexible fiber-orientation within the composite and its complete consolidation with a thermoplastic polymer enables solutions with high structural strength and ultra low material thickness. Customization of Tepex® properties to individual requirements enable high performance material solutions for almost any application and industry.

2. Lightweight Design

Tepex® provides an exceptional weight-performance-ratio offering suitable solutions for all applications that require weight reduction without compromising structural performance.

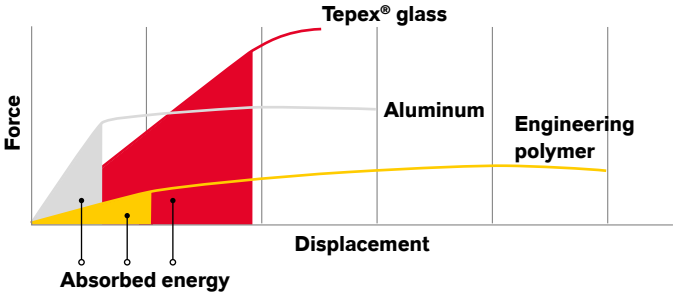
Weight-specific Performance



3. Dynamics & Energy Absorption

Depending on material thickness and combination of fibers and thermoplastic polymers, Tepex® can provide material properties from high flexibility to high stiffness. Compared with other material classes these tailor-made properties of thermoplastic composites enable higher specific rates of energy absorption and make Tepex® a perfect solution for applications that require dynamic properties at reduced weight.

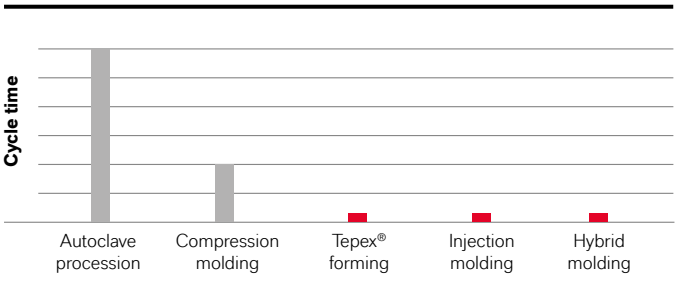
Superior energy absorption



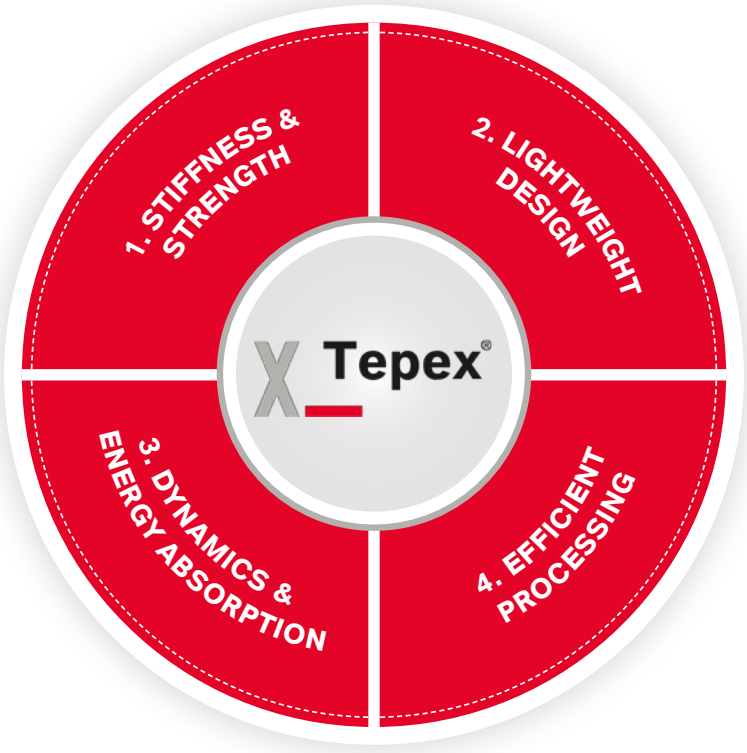
4. Efficient Processing

Tepex® materials are sold as semi-finished goods ready to be processed in thermoforming, hybrid molding or compression molding. Tepex® thermoplastic composites are designed for mass production manufacturing processes with low cycle times and constantly high quality. The processing of Tepex® can be combined with compression as well as injection molding so that complex parts can be manufactured in only one processing step. Besides a significant reduction of overall cycle time, major advantages of such hybrid molding processes are efficient use of material, elimination of product forming and trimming steps as well as increased freedom of part design.

Processing speed – improved quality



Solution specific material design & cost efficiency



What is your material requirement?

ENDLESS POSSIBILITIES – MARKET PROVEN APPLICATIONS

Automotive

The automotive sector is facing increasingly strict requirements regarding fuel efficiency and weight reduction. All these requirements have to be met without compromising safety, performance and processing efficiency. Tepex® provides material solutions for structural and semi-structural parts that bridge such apparent contradictions of weight reduction, structural performance and maximum energy absorption. Low processing cycle-times of Tepex® material systems enable cost efficient parts and reliable mass-production processes in the automotive industry.

Industry

Many industrial processes and applications rely on efficient use of energy. Moving parts made of Tepex® can significantly reduce their kinetic energy through weight reduction without compromising structural performance. Specific material properties like flame retardancy, resistance against elevated temperatures as well as the ability to absorb ballistic energy extend the field of applications for Tepex® in many industrial segments such as electrical and electronic equipment, in the public transport sector, protection sector or in the aerospace industry.

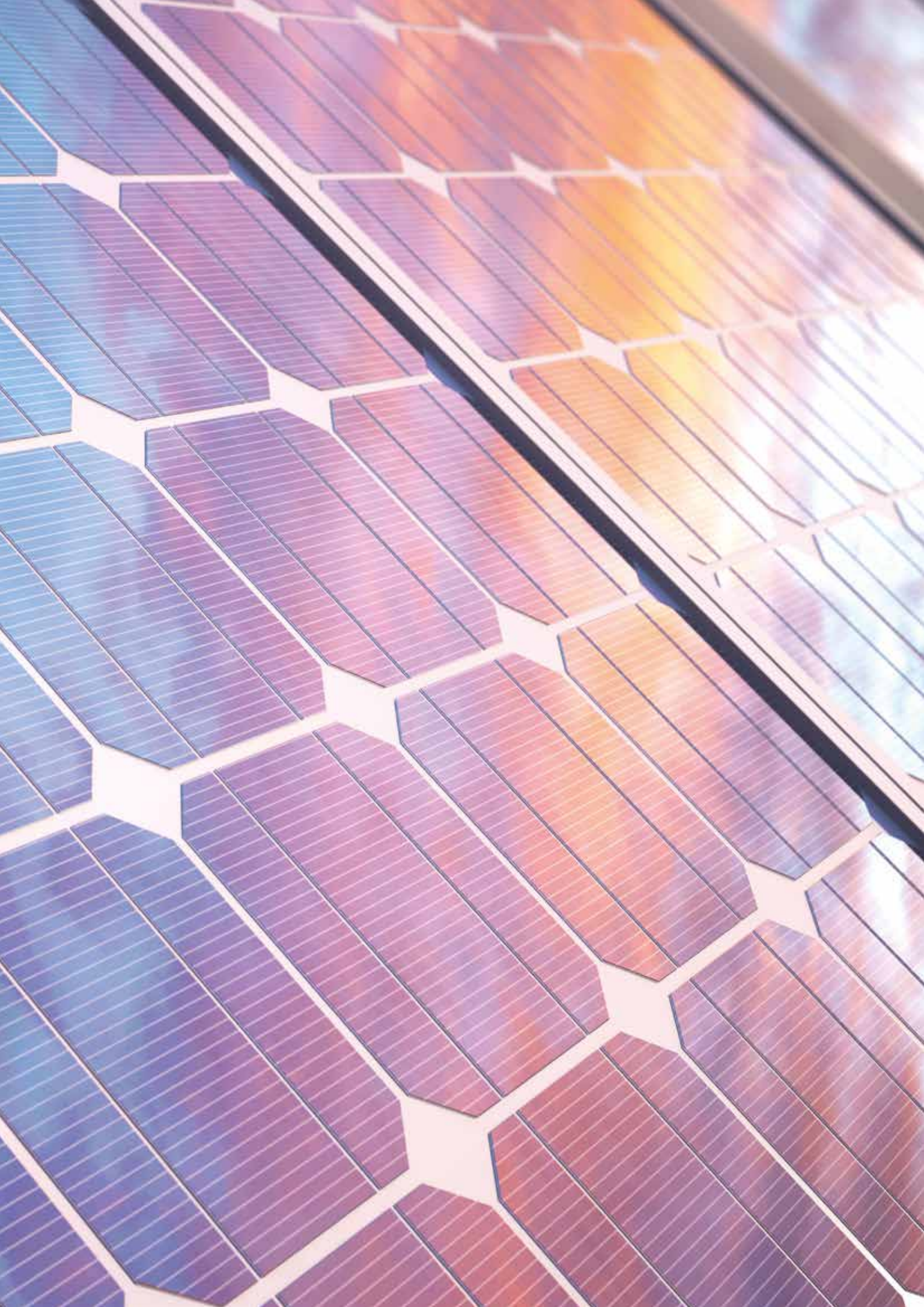
Consumer Electronics

Besides weight reduction, functional integration and enhanced robustness modern electronic devices demand individual design and aesthetic attractiveness in terms of optical and haptic appearance. Tepex® thermoplastic composites with its superior strength-to-thickness ratio enable thin-wall structural applications for consumer electronics applications such as mobile phones, tablet PCs, notebooks and television sets. These structural properties can be integrated in Tepex® materials with premium surface properties for visible as well as for coated surfaces. For consumer electronics Tepex® offers the highes flame retardant rating UL 94 V-0 for a wide range of thicknesses and for fabric lay-ups.

Sports

As broad as the spectrum of sports equipment are the required material characteristics in applications like the sole of a sports shoe, bicycle components, ski boots or protective clothing and helmets. All these different performance requirements can be met by customized Tepex® material solutions. These combine reduced weight of parts and components with optimum performance such as energy return, impact resistance as well as premium aesthetics of visual parts and surfaces.

Industry specific solutions based on thermoplastic composites



STANDARD MATERIALS FOR CUSTOMIZED SOLUTIONS

Tepex® dynalite – Maximum strength at minimum weight
The Tepex® dynalite range consists of multiple layers of continuous fiber reinforcements in a matrix of engineering thermoplastics. The continuous fiber structure, fully consolidated with a thermoplastic polymer, provides the maximum possible strength and stiffness.

Tepex® flowcore – cost effective flow molding
Tepex® flowcore consists of long (< 50 mm) glass or carbon fibers, similar to traditional glass mat thermoplastic materials (GMT), but based on engineering polymers. In optimizing design, Tepex® flowcore can be combined with Tepex® dynalite to provide stiffeners and ribs for reinforcement. Tepex® flowcore materials can be processed by standard compression molding and are intended for automotive and industrial use when standard GMT and injection molding thermoplastics cannot meet temperature and structural requirements.

Tepex® optilite – Excellent aesthetics combined with maximum strength at minimum thickness
The Tepex® optilite material system contains multiple layers of continuous fiber reinforcements in a thermoplastic matrix. Strength, stiffness and weight parameters are comparable to those of Tepex® dynalite. In addition, these materials are tailored for applications with superior surface quality, e.g. consumer electronics and sporting goods. Tepex® optilite materials can be customized to meet aesthetic design requirements and provide a competitive edge in fast moving consumer markets.

NOMENCLATURE

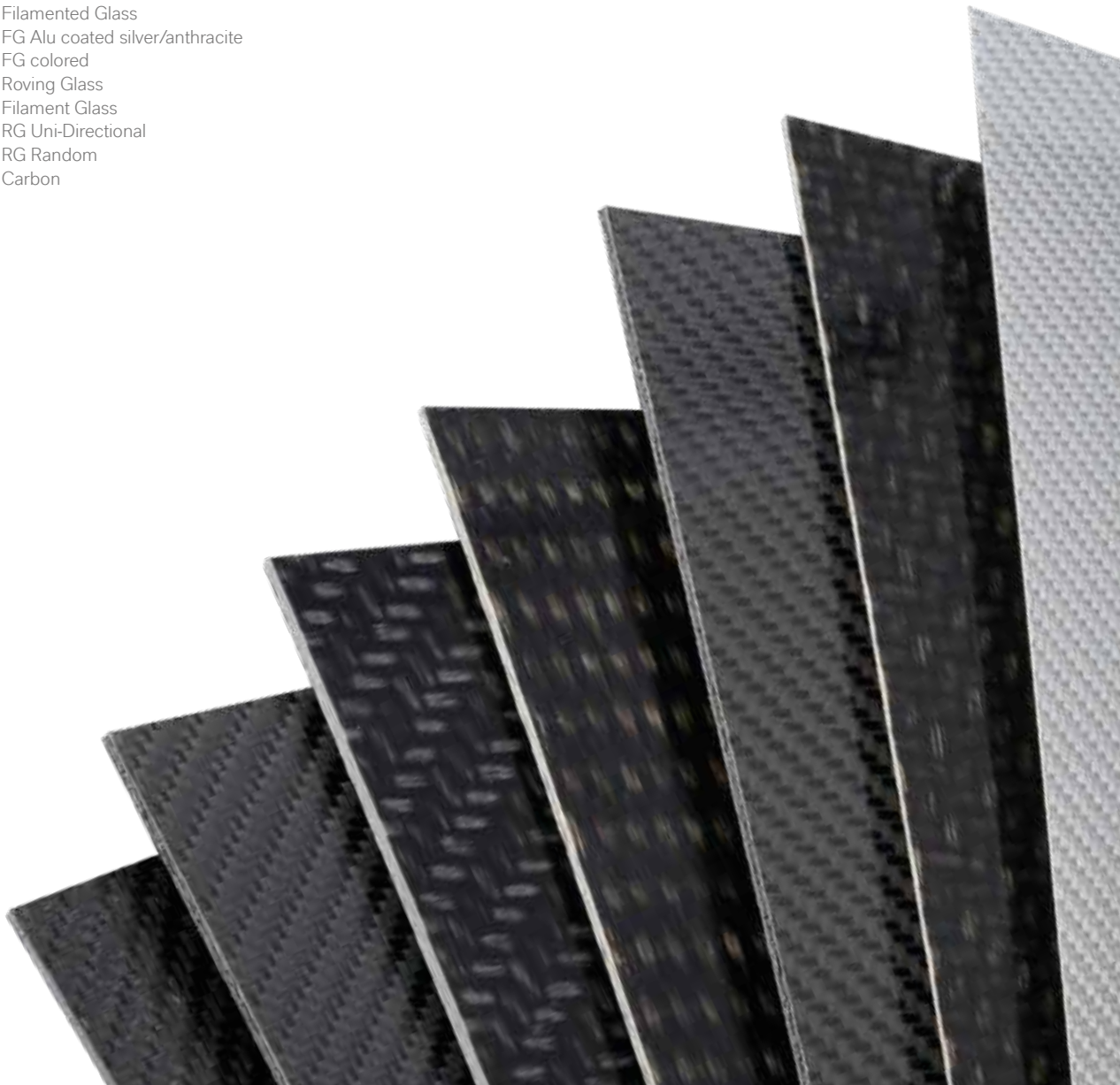
Tepex® dynalite

1 08-FG 29 0 (4)/45% - 1.0 mm

- **Laminate thickness**
- **Fiber volume content**
- **Number of fabric layers**
- **Weaving style** (0 = 2/2 twill, 1 = plain weave)
- **Area weight** (*10 g/m²)
- **Fabric code** (see below)
- **Polymer type:** 1 = PA 66 | 2 = PA 6 | 4 = PP | 6 = PA 12 | 7 = PPS | 8 = TPU | 10 = PC
- **Fiber type:** 1 = Glass | 2 = Carbon | 4 = Glass/Carbon

Fabric code:

FG	= Filamented Glass
FGAL	= FG Alu coated silver/anthracite
FGc	= FG colored
RG	= Roving Glass
FG	= Filament Glass
RGUD	= RG Uni-Directional
RGR	= RG Random
C	= Carbon



INNOVATION & PROCESSING

Material Design

Tepex® is an innovative material system ready for customization to address application specific requirements and properties in a broad variety of applications and industries. In order to select the best-fit Tepex® material system and customize it for a specific application requirement, material and application development experts of Bond-Laminates and LANXESS closely cooperate with our customers – and of course ensure that customer specific intellectual property stays protected. Such cooperation ideally starts in an early product development stage so that material design will not only focus on optimum compatibility of fibers and polymers, automated and cost efficient production and quality control at Bond-Laminates, but can also support effective part design and efficient processing of semi-finished Tepex® material in our customer's manufacturing processes.

Manufacturing

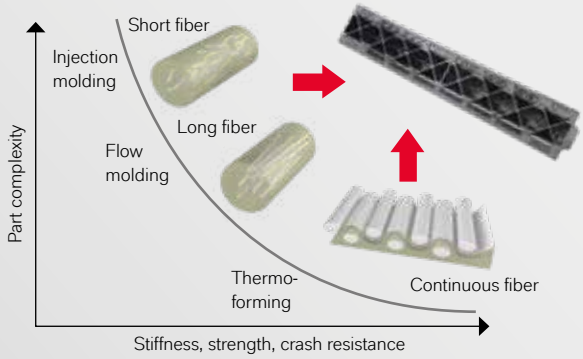
Tepex® materials are manufactured made-to-order in a continuous lamination process based on long-term experience in material design and manufacturing of thermoplastic composites. The proprietary manufacturing process ensures complete consolidation of the individual fiber structure with the thermoplastic matrix. Required material properties are continuously monitored and tested. Being produced in a continuous process Tepex® materials can be delivered as sheets (with a standard width up to 1250 mm and a sheet length that can be optimized per application) or as form-cutted plates ready for processing in compression or injection molding processes.

Processing

Working together with Bond-Laminates, customers can dock into a realm of material and processing know-how about thermoplastic composites in different industries and applications. Bond-Laminates continuously works on enhancing this know-how, e.g. through intelligent networking with processing partners and academic research facilities as well as through its highly trained employees. Bond-Laminates wants to be a trustful partner from the first product design idea to the successful delivery of Tepex® parts — to enable leading edge products with superior performance and design.

Intelligent, customized Tepex® material system – Maximum innovation with superior performance

Hybrid Technology using Tepex®



Tepex®

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Please also consider visiting our website for further information:
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