



Ballistic Protection

We Enable Energy

As one of the oldest industrial companies in Switzerland, founded in 1803, we focus on products for power generation, rotating machines, composites and mechanical engineering. Von Roll is the global market leader and the only company to offer the complete range of insulation products, process equipment and services.

For more than 100 years, we have been making outstanding contributions to this market, developing a number of highly innovative products that have enabled steady increases in power generation, current distribution and switchgear.

As a unique partner for composites, we have successfully transferred our long experience with thermoset materials to the field of ballistic protection. Today we also contribute to control of ballistic energy with our solutions for military, paramilitary and civilian purposes.

With our especially developed product range Para-Lite®, customers enjoy the following benefits:

- » Lightweight
- » Flexibility
- » Non-corrosivity
- » Approved and tested components

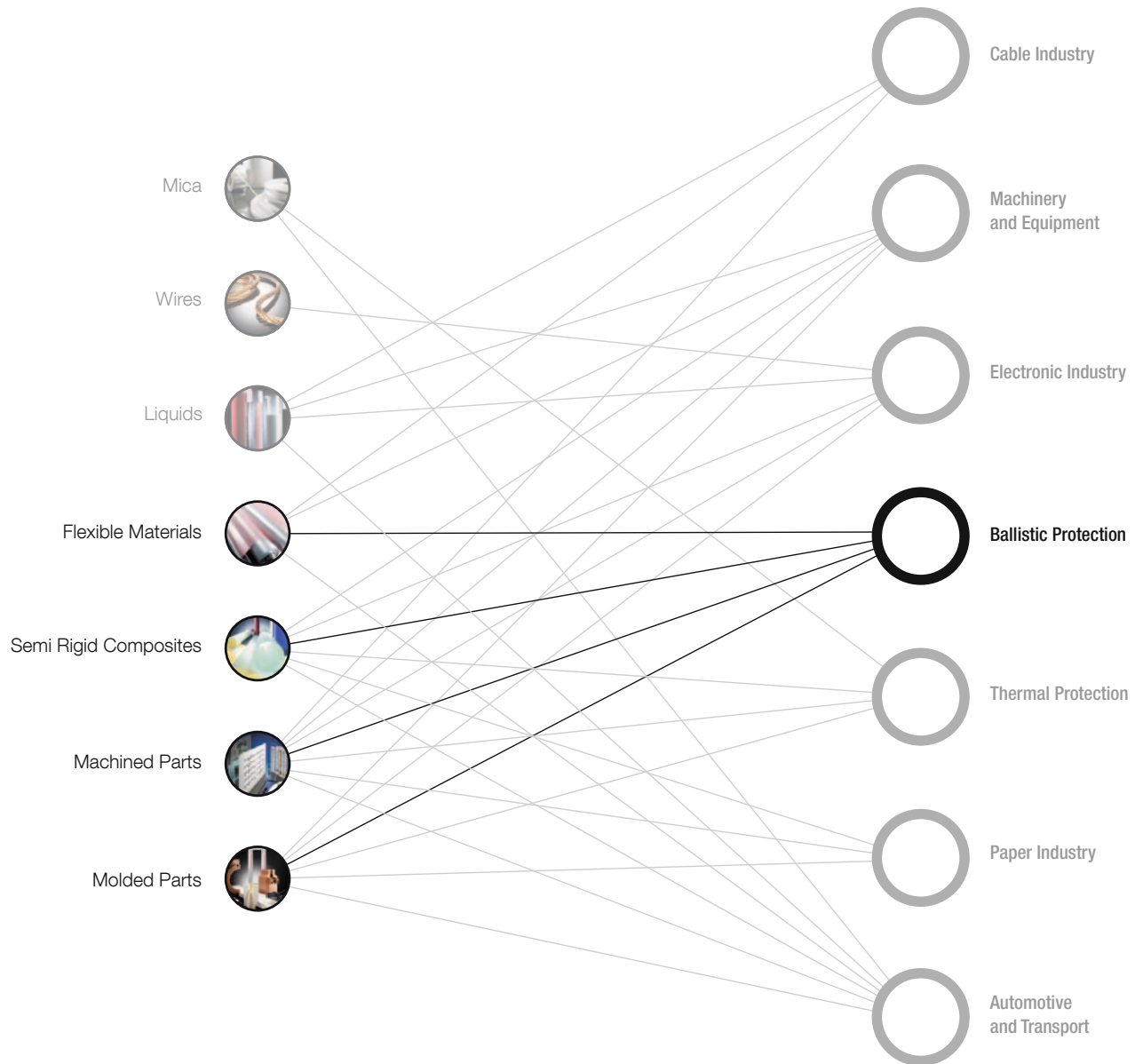
Von Roll prides itself on devising competitive and flexible solutions to meet your particular specifications, including weight, ammunition, standards and testing methods, as well as shape and size. Each customer demand usually requires its own internal study to propose a suitably adapted product. We perform the necessary tests for you using our own equipment and recognized labs. The goal is to certify international ballistic standards such as STANAG, EN, NIJ and NFP.

We have available a broad range both of production processes and substrates and resins, from E-glass to aramid or polyethylene reinforcements, from phenolic to polyester resin systems and from specific ceramics to films and ceramics for backings. This wide variety combined with the experience and technology of our machining centers allows us to offer you the perfect solution for your application. We can supply machined parts from customers' drawings ready-made to be built in.

This includes an extensive portfolio of high-quality materials for armored defense that enables us to provide solutions for military, paramilitary and civilian applications.



Our Products for Ballistics



Von Roll offers full system solutions for every market shown in this application tree. Please contact us or visit our website www.vonroll.com for further information.

Ballistic Protection Product Range

Durapreg® and Para-Lite® prepregs

Durapreg® comprises a range of various aramid and phenolic prepregs for the production of molded parts for rigid ballistic protection, e. g., combat helmets and inserts for vests. Durapreg is available in different chemical grades and reinforcement weights to match customers' process requirements and to fit end applications.

Prepreg Para-Lite® PGR

Prepreg Para-Lite® PGR is based on E-glass roving and phenolic resin. The product is flame-retardant and generates low smoke opacity and toxicity in the case of a fire. Standard characteristics include various fabrics (see table below).

Para-Lite® laminates

Para-Lite® is a ballistic product range based on different types of reinforcement and specific resin systems designed to match ballistic standards, as standalone or combined with other materials. Para-Lite® is supplied as flexible or rigid materials, sheets or machined/molded parts, tubes or assembled components.

Para-Lite® laminates can be delivered as engineered panels or combined with ceramic tiles, infrared reflective cover layers (thermal insulation) or honeycombs to fit particular applications.

Para-Lite	Reinforcement	Resin system	Standard sheet size density	Short description
PGR 20	E-glass roving fabric (830 g/m ²)	Phenolic	Up to 4270mm x 1270mm, 2070mm x 1070mm, also in variable length, d=2.15	Cost-efficient material, flame resistant, low smoke emission in case of fire
PHT 20	HiPer-tex™-glass roving fabric (820 g/m ²)	Phenolic	Up to 4270mm x 1270mm, 2070mm x 1070mm, d=2.0	Flame resistant, low smoke emission in case of fire, 15% more efficient than PGR 20
PGR S2	S-glass roving fabric (820 g/m ²)	Phenolic	Up to 4270mm x 1270mm, 2070mm x 1070mm, d=2.0	Flame resistant, low smoke emission in case of fire, 20% more efficient than PHT 20
65340	E-glass roving fabric (830 g/m ²)	Polyester	2950 mm x 1330mm d=2.0	Cost-efficient material
65320	S2-glass roving fabric (816 g/m ²)	Polyester	2950 mm x 1330 mm d=2.0	20% more efficient than 65340
65440	Para-aramid fabric (410 g/m ²)	Phenolic	2100mm x 1100mm d=1.2	Rigid laminate, high-tenacity aramid
65470	Para-aramid fabric (460 g/m ²)	Phenolic	2100mm x 1100mm d=1.2	Rigid laminate, standard aramid type
FLEX-410	Para-aramid fabric (410 g/m ²)	Phenolic/rubber	2100 mm x 1100 mm d=1.2	Flexible laminate, high-tenacity aramid, single or double coated
FLEX-460	Para-aramid fabric (460 g/m ²)	Phenolic/rubber	2100mm x 1100mm d=1.2	Flexible laminate, single or double coated
PP	Polypropylene yarn twill fabric	PP of lower melting point	2450mm x 1240mm d=0.8	Low-density material, can be shaped
65400	UHMWPE	PE	2500mm x 1500mm, 2500mm x 800mm, d=1.0	Less weight, can be shaped

Military Applications

Von Roll provides high-quality materials for individual protection and spall liners, add-ons or backings for various uses, such as light reconnaissance and troop-transport vehicles, tanks and tank turrets, shelters, transmission centers, ambulances, warships, minesweepers and special containers.

Durapreg® prepregs for rigid individual ballistic protection

Durapreg® is used in producing molded parts for hard ballistic protection, e.g. combat helmets and inserts for vests in accordance with all levels of NIJ 0101.04 standards.

Vehicle spall liners and add-ons

Von Roll provides spall-liners and add-ons based on different solutions:

» Thermosets: Para-Lite® PGR 20, PHT 20, PGR S2, 65320, 65340, 65440, 65470

Reinforcements: E-, HiPer-tex™-, S2-glass roving or different aramid fabrics

Resin systems: phenolic or polyester.

» Thermoplastics: Para-Lite® PP, 65400

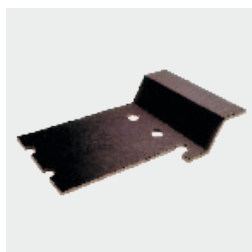
Para-Lite® PP: lightweight laminate enabling partial or full aramid substitution without weight increase that can be covered with various customized decorative skins or with a ready-to-glue layer.

Tailor-made solutions

These materials can be combined with thermal insulation with infrared reflective properties for deserts or sunny areas or with decorative layers suitable for vehicle interiors. For higher threat levels laminates can be associated with ceramic tiles.



Spall liners



Vehicle floor spall liner



Vehicle side wall spall liner

Blast floor panels for vehicles

These sandwich structures are composed of ballistic laminates associated with core materials that may be covered with various skins, e.g. anti-sliding rubber or decorative cover. These materials are designed to protect vehicles in accordance with STANAG 4569 standards.



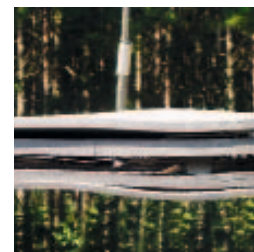
Bomb blast test (8 kg TNT) with Von Roll blast floor panel



Von Roll blast floor panel BEFORE explosion



Von Roll blast floor panel AFTER explosion



Close-up of Von Roll blast floor panel limited bulge AFTER explosion

Source: SVOS/BASE

Paramilitary and Civilian Applications



Panels for shields

Von Roll manufactures high-quality panels intended for fabricating shields according to levels of ballistic protection defined by EN 1522 ballistic standards.

Panels for car armoring

Von Roll offers panels for vehicle armoring constructed in accordance with ballistic protection levels defined by ballistic standards EN 1522.

Para-Lite® FLEX is a flexible laminate that includes lightweight protection for vehicle armoring against exterior threats. It can be fully bent, inserted and fixed into vehicle doors or behind interior parts, even with a high curve radius. It is delivered as engineered panels to fit all types of vehicles.

Para-Lite® armored partitions

Para-Lite® armored partitions combine a ballistic laminate with a lightweight honeycomb structure covered on the sides and edges with a decorative skin. The mix of various skins and core materials makes it possible to meet specific thermophonic insulation, deletion weight and ballistic requirements, as well as design specifications.

Von Roll can propose lightweight integrated solutions of bulletproof ballistic materials for different levels of threat:

- » 9 mm Para
- » .357 Magnum
- » Brenneke pump rifle at short-distance shots



Car armoring



Panel for wheeled shield



Partitions with junctions

Further Applications

Para-Lite® armored partitions can be adapted to any building or renovation project. Dimensions are very close to standard partitions and decorative skins can be customized.

Examples of applications include police offices, shelters, embassies, airports, banks, courts, armories, jails, modular constructions, security doors and secured reception areas.

Safety cabins for secured areas

Developed from the armored partition concept, safety cabins are used to protect against accidental weapons discharge in armories, complementary to sand traps, neutralization tubes or bags.

Von Roll provides easy-to-build, lightweight assemblies consisting of ballistic materials that offer protection in accordance with the three classes defined by the French police authorities (Bureau des Affaires Immobilières de la Police Nationale, BAIPN).



Lightweight structures for security areas in airports

We Enable Energy

Von Roll is the sole full range supplier of materials and systems for the insulation of electrical machines as well as high-performance products for various high-tech industries.



Mica

All materials related to high-voltage insulation. Von Roll's commitment to mica starts with mining and ends with finished tapes.



Wires

Insulated round, flat and Litz wires for high-voltage, low-voltage and electronic applications.



Cables

Mica tapes for fire-resistant cables. Von Roll provides a wide range of products that are ideally suited to all commonly used standards.



Liquids

Impregnation resins for high and low voltage, potting resins, casting resins, as well as encapsulating and conformal coatings.



Composites

Engineered materials made from a resin and a support structure with distinct physical, thermal and electrical properties. They can be molded, machined or semi-finished.



Flexibles

Insulating flexible materials for low-voltage applications such as flexible laminates and adhesive tapes.



Ballistic Protection

High-quality systems for armored defense based on thermoset / thermoplastic products in single-use or tailored combinations.



Transformers

High-performance transformers for power transmission and distribution, tailored solutions to all applications of today's energy-supply companies.



Testing

Von Roll provides electrical, thermal and mechanical testing of individual materials as well as complete insulating systems. We are UL-certified.



Training

Von Roll Corporate University provides a training program in high- and low-voltage insulation to its customers.

Please contact us or visit our website www.vonroll.com for further information:

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About Von Roll

We Enable Energy – As one of Switzerland's longest established industrial companies, Von Roll focuses on products and systems for power generation, transmission and distribution. Von Roll's business portfolio is divided into five business segments: Von Roll Insulation is the global market leader in insulation products, systems and services. Von Roll Composites produces composite materials and parts for assorted industry appliances. Von Roll Transformers offers complete solutions for the fast expanding market of high performance transformers. Von Roll Water provides solutions for process engineering tasks in the field of water and waste water management. Von Roll Solar is developing a third-generation solar cell.