

MARKETS // PRODUCTS

# COMPOSITES FOR INDUSTRIAL APPLICATIONS

VRI COMPOSITES IS NOW A DIVISION OF THE GUND COMPANY



# WE ENABLE ENERGY

VRI Composites is now a division of The Gund Company. We will be better together. Both companies have a remarkable history that focuses on products, service and systems for power generation, transmission and distribution, rotating machines and mechanical engineering. Combined, we will strive to become a global market leader for insulation products and a company that offers the complete range of insulation products, composites, consulting, tests and services for multiple industries.

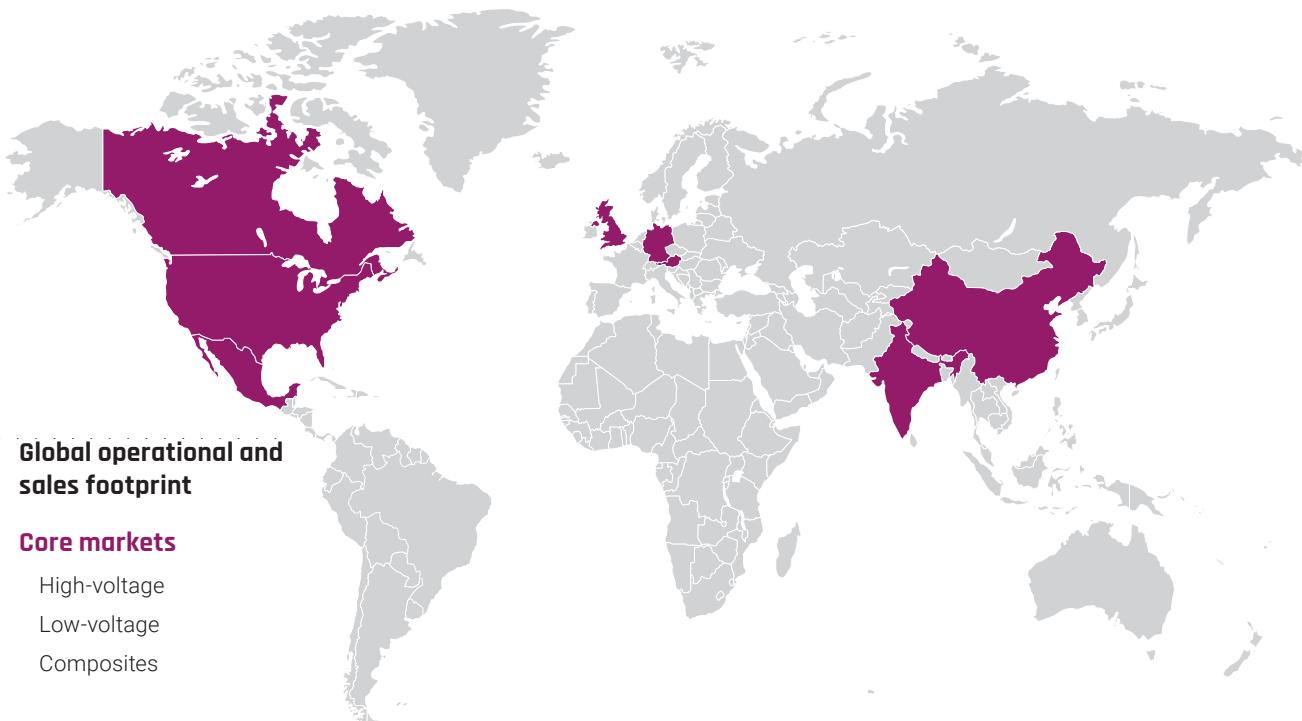
For more than 70 years, The Gund Company has been making outstanding contributions to global markets, developing a number of highly innovative products. We invite you to learn more about our partnership and explore the enhanced opportunities ahead of us.

**Customers enjoy the following benefits:**

- One single source for all insulating materials
- Thorough expertise from power generation and transmission to its efficient utilization
- Proven compatibility for system components
- Testing of both materials and systems
- Consulting for applications and technologies
- Training in insulation materials and systems

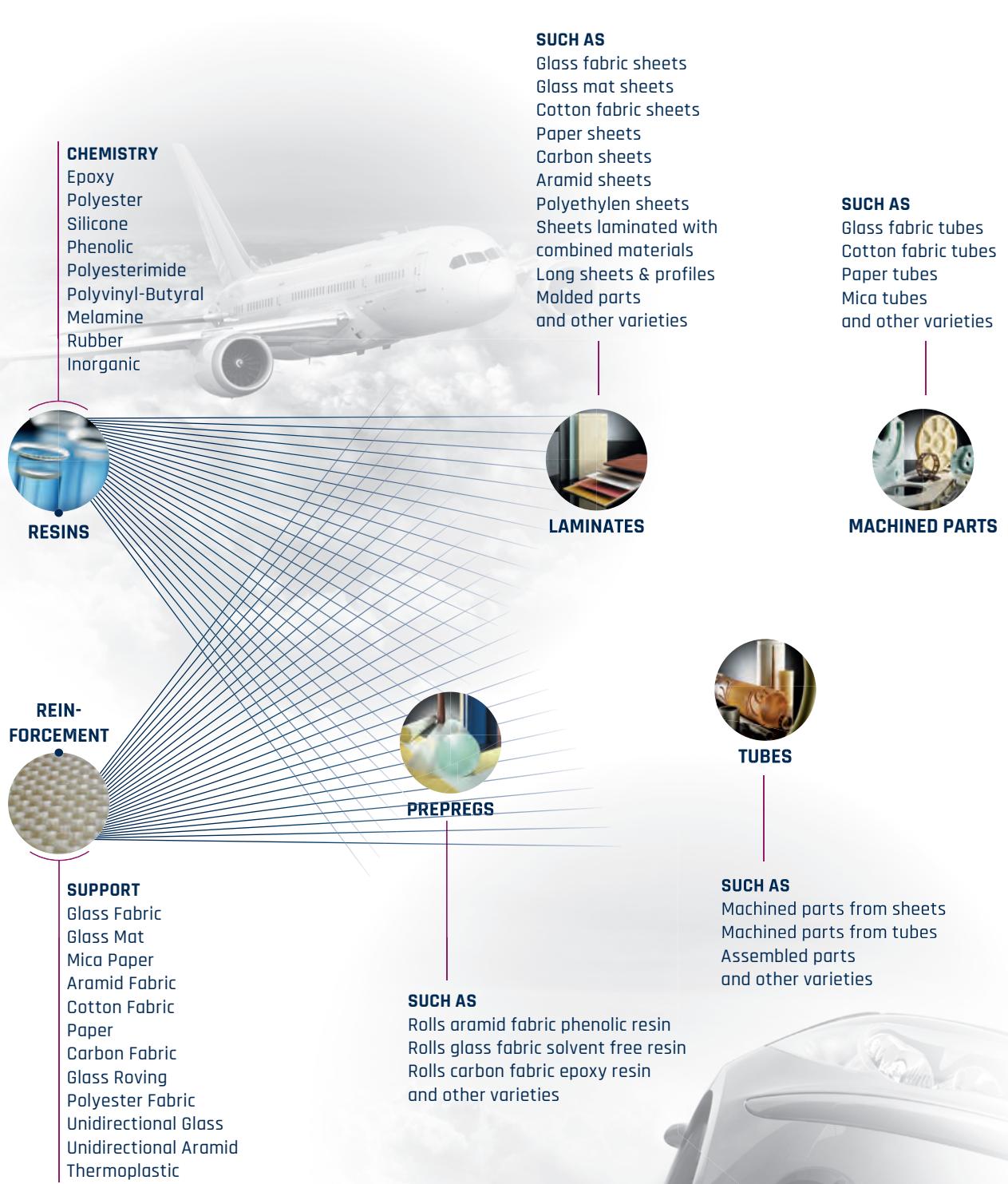
# WHO ARE WE?

VRI Composites is now a division of The Gund Company - both recognized leaders in Manufacturer of Engineered Material Solutions. Our composite product lines deliver high-performance solutions across multiple markets including aerospace, defense, space, automotive, energy generation and distribution, electronics, and industrial markets worldwide.



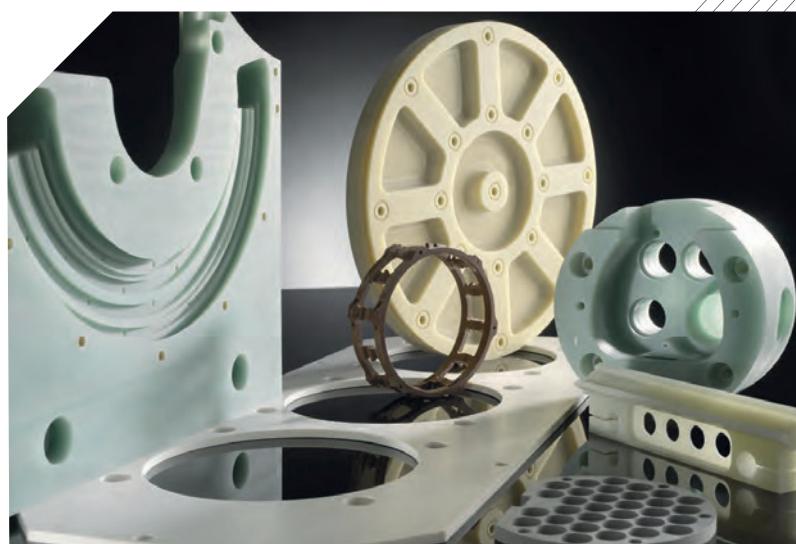
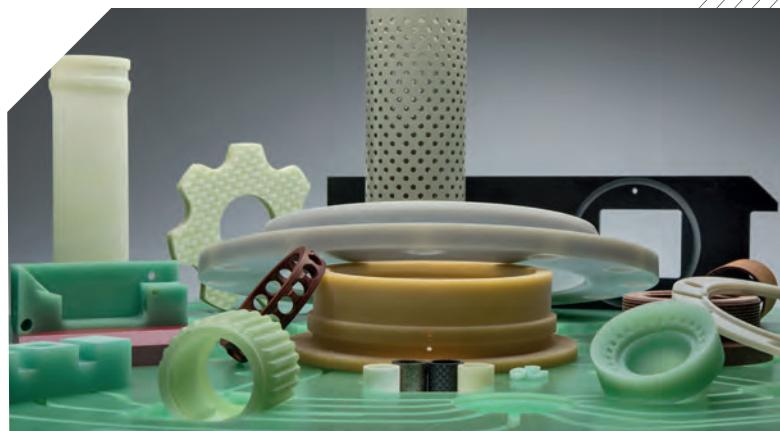
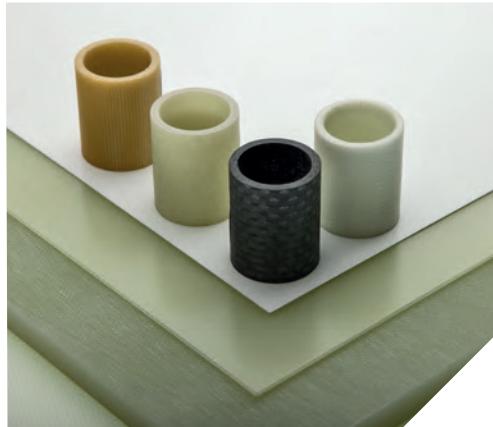
# AN ENDLESS VARIETY OF COMPOSITES

- From mica, glass, synthetic fibers, natural reinforcement materials, polyester to high temperature- resistant resin systems: many combinations are possible.
- The wide variety of attributes, combined with the experience and technology of our machining centers, allows us to offer you the perfect solution.



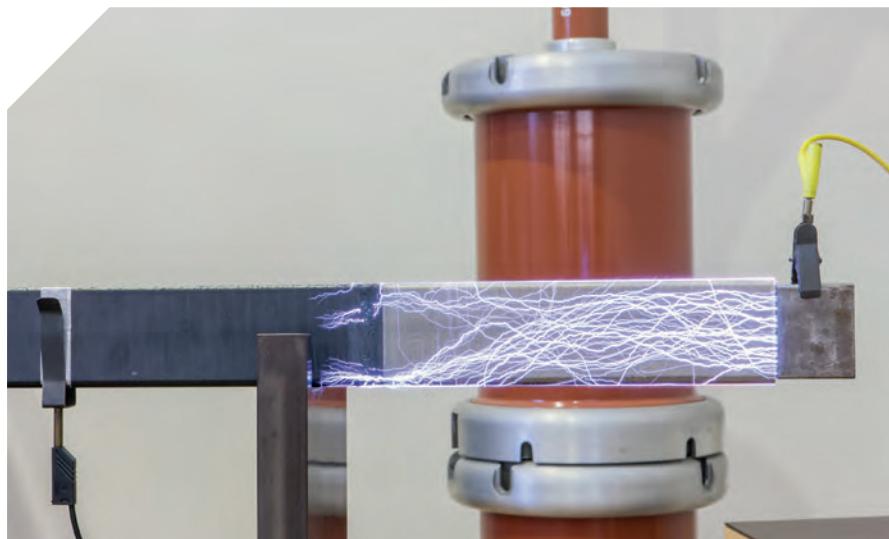
# AN ENDLESS VARIETY OF COMPOSITES

- We can supply machined parts from customers' drawings, ready-made to be incorporated into many types of applications.
- Such parts include an extensive range of top-quality tubes and cylinders made from various reinforcement materials, such as Samica®, glass fabric, glass mat, cotton, paper, aramid, polypropylene.



# KEY COMPOSITE ASSETS

- State-of-the art industrial plants for resins, prepreg, and composite manufacturing
- Strong background in resin formulations for thermal and electrical insulation
- Strong know-how in high and low pressure laminating technology.
- Global R&D and sales organization supporting the industrial and mass transportation business.



Unique testing capabilities



Wide range of Horizontal and Vertical prepreg lines

# THERMAL APPLICATIONS

- VRI Composites and The Gund Company are market leaders of thermal resistance laminates for insulating parts metals processing including: ovens, furnaces and presses
- Our products offer key benefits such as high compression strength from 23°C to 250°C, low thermal conductivity and relatively low density.

	Description	Density (gr/cm <sup>3</sup> )	Flexural strength @ 23°C (MPa)	Compression strength @23°C (MPa)	Heat resistance temperature (short timing)	Thermal conductivity (W /m K)
VETROTHERM	High pressure laminate	2.05	730	750	280	0.30
VETROTHERM F	Low cost grade	1.85	180	330	230	0.30
VETROTHERM R	Low density grade	1.95	650	700	260	0.30
VETROTHERM S	High Tg laminate	1.85	160	330	500	0.29
VETROTHERM Light	Lowest density grade	1.25	150	270	230	0.15
Pamitherm 41140	Highest temperature resistance	2.20	170	350	600	0.21

## Other applications include:

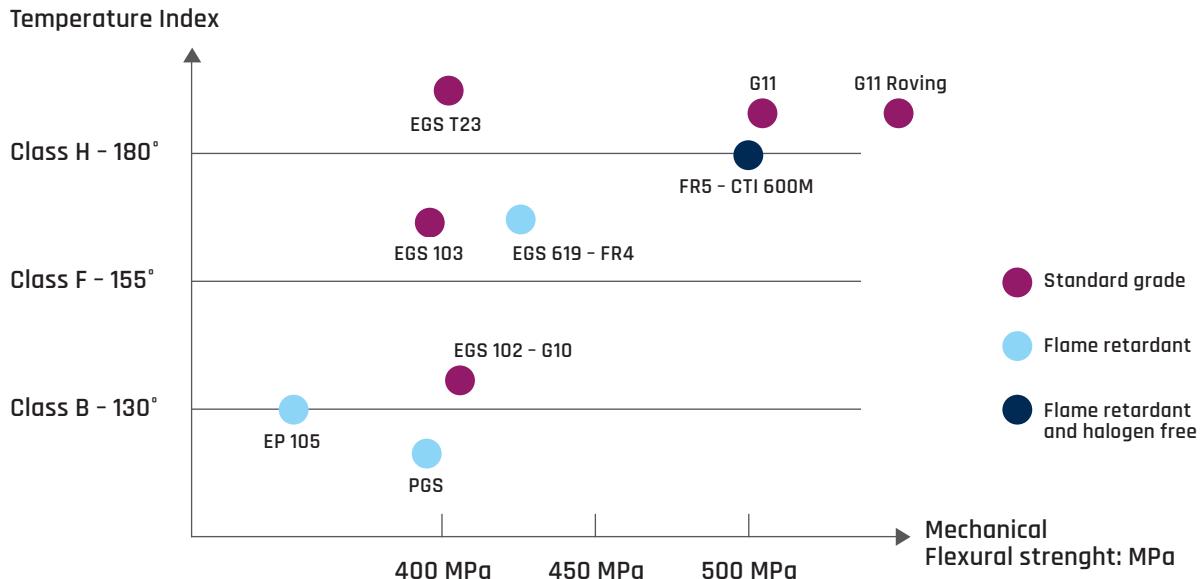
- Shield T Mica based composite parts for battery protection and thermal runaway prevention.
- Thermal insulation parts for industrial applications including: gaskets, seals, spacers



# ELECTRICAL INSULATION

VRI Composites Von Roll Augsburg has developed since many years high-pressure laminate products for electrical insulation.

- Broad portfolio available
- Products specific for various thermal class systems.
- Certifications available
- Own formulations
- Flame retardant versions

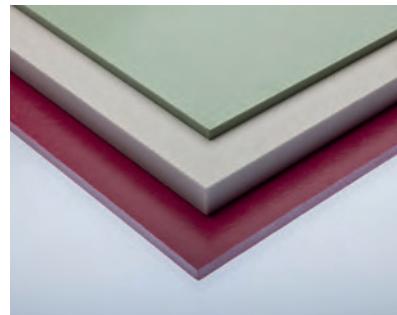


Alternatively glass mat laminates are manufactured using low-pressure techniques and are characterized using mainly glass mat or chopped glass as a reinforcement material bonded with a polyester resin system.

Durapol® laminates are widely used in the electro-mechanical industries.

## Durapol F200 SMC

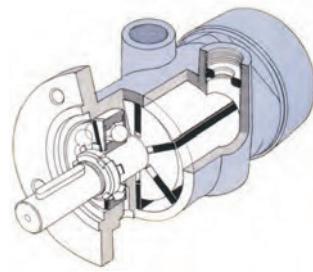
- Halogen free and flammability V-0 according UL 94 even with thickness greater than 3 mm.
- Mainly used for switchgears



## Durapol M602 SMC

- UL 94 V0 even above 5mm.
- Very high Dielectric strength, 90°C in oil, perpendicular: 13 KV/mm.
- Mainly used for transformers.

# HIGH PRESSURE LAMINATES FOR ANTI-FRICTION



VRI Composites and The Gund Company offer high performance products for slides and vanes in pumps, compressors and compressed air motors. Two product families include:

## Cotton phenolic slides (Canevasite)

- Most of the grades need to be oil lubricated.
- They are mainly used for compressed air motors.

## Glass epoxy or phenolic slides

- Run in flood lubricated pumps.
- Used if higher temperature stability is required



- Known under the trademark Canevasite®, the range of phenolic cotton laminates comprises several grades, each having specific properties.
- Machined parts made from Canevasite® substantially extend the life of machines and mechanically stressed components, thereby resulting in excellent cost savings.

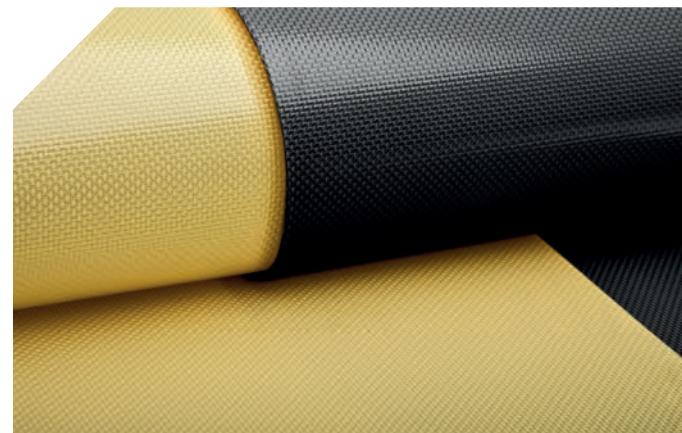
	Description	Density (gr/cm³)	Flexural strength @ 23°C (MPa)	Compression strength @23°C (MPa)	Breakdown voltage // (KV)	Comp. Tracking Index (V)
CANEVASITE PF CC 201	Standard PF CC 201 – NEMA C	1.34	120	300	5	150
CANEVASITE PF CC 202	Standard PF CC 202 – NEMA CE	1.34	135	300	24	200
CANEVASITE PF CC 203	Standard PF CC 203 – NEMA L	1.35	155	310	10	200
CANEVASITE PF CC 204	Standard PF CC 204 – NEMA LE	1.34	140	310	27	200
CANEVASITE FF 5964	Based on very thin cotton fabric for good resistance to wear, vanes in air motors (oil-lubed)	1.34	130	300	12	150
CANEVASITE VRI-BAT	Based on Batist cotton fabric and used for miniature parts, e.g. ball bearing cages, vanes for high speed air motors (oil-lubed) in dental equipment.	1.30	135	340	15	120
CANEVASITE FF-PTFE	Self-lubricating and elastic features, vanes in air motors (oil-free)	1.45	135	250	15	120
CANEVASITE F18 C6	Low friction material	1.37	135	270	15	120

# BALLISTIC AND DEFENSE

- 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.
- VRI Composites and The Gund Company provide 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



Spall liners



## Selected products:

- Para-Lite® Flex and Para-Lite® PGR 20 provided as laminate and machined parts

# MASS TRANSPORTATION

## Cabin interiors

- VRI Composites provides laminates and prepgs based on fire-retardant resins and structural fabrics that find specific applications as "Low smoke density and Low flammability" panels for trolleys, cable ducts and other flat walls and parts inside aircraft cabin (acc. to ATS 1000.001 / FAR 25.853) and train (acc. to EN45545).

## Key products are:

- Vetronit FR5 HF CTI 600M: special laminate made of fine weave glass fabric bonded with halogen free and temperature resistant epoxy resin.

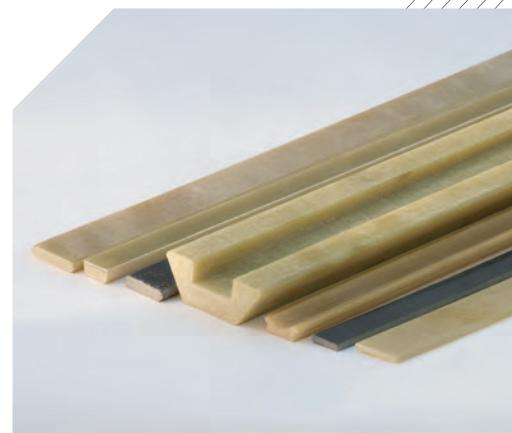


## SLOT WEDGE FOR TRACTION MOTORS

- VRI Composites provides slot wedges, used primarily in electric motors, wind generators or traction motors.
- Slot wedges are used to hold the stator windings in the slots formed between the stator teeth.

## KEY PRODUCTS ARE:

- Vetronite G11: a specific electrical insulating laminate.
- Vetroferrite laminate and Vetroferrite Prepg composed of a very special type of glass fabric and high temperature epoxy resin with high content of iron powder. These products are specifically used for magnetic slot wedges, often used to improve starting performance of large induction motors.



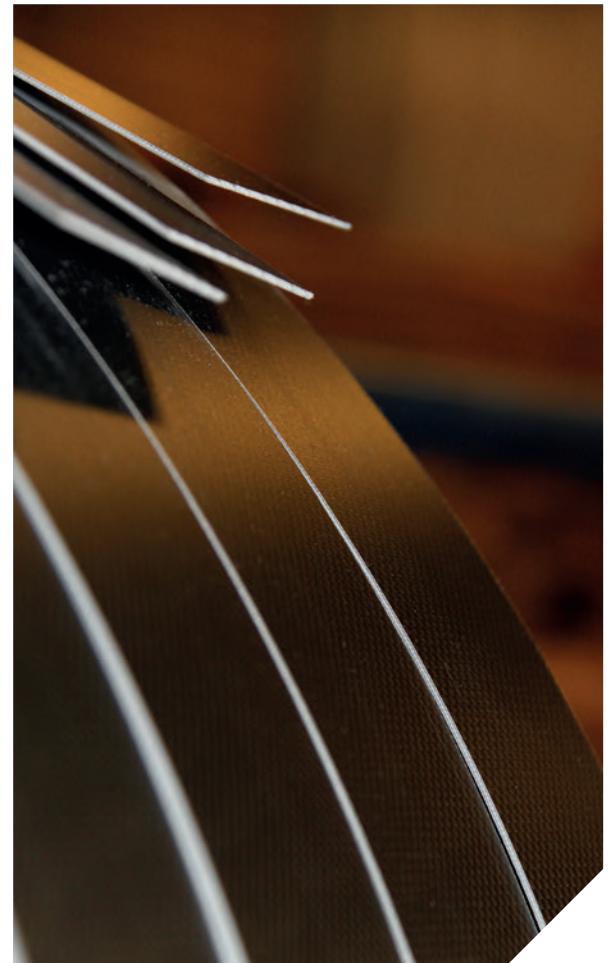
# SPECIALITIES

## DOCTOR BLADES

- Doctor blades are thin composite stripes designed for use in paper-making equipment.
- Based on different reinforcement materials (glass, carbon and cotton) with specific fillers (abrasive, graphite) and resin systems, doctor blades (manufactured by VRI) provides the solution to various problems relating to corrosion resistance, temperature resistance, wear and softness for paper machine cylinders.
- Doctor blade products are manufactured in rolls up to 150 meters in length, and in various thicknesses up to 3.25 millimeters. Coils can be chamfered or routed.



Doctor blades are used in the paper industry



Carbon doctor blades in roll strips

# ELECTRONICS

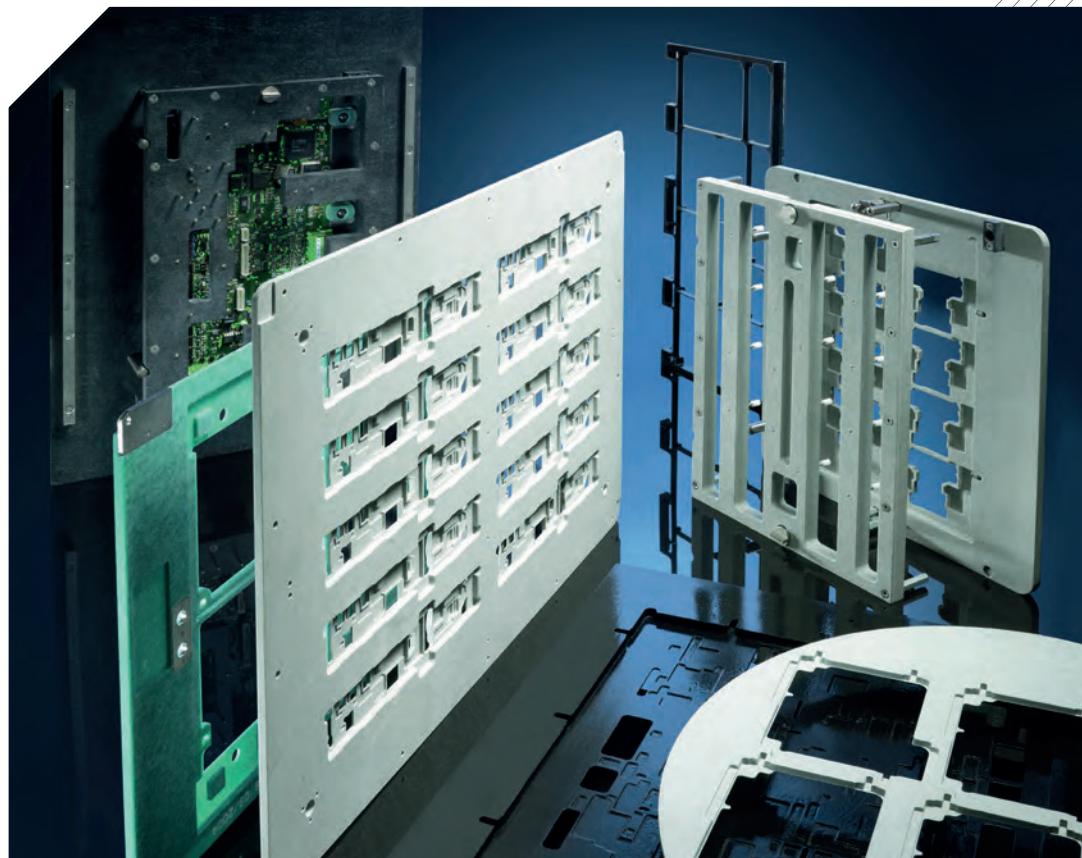
## Laminates with antistatic features

Offering of products with special dissipative performance:

- EP 105 and EP 105 AS epoxy paper /glass epoxy
- Adaponit 105 AS with a phenolic paper core
- ▪ Vetrone EGS T23 AS
- ▪ Vetrone EGS 619 AS with self-extinguishing characteristics

## Special applications

- Antistatic parts
- Solder frame
- Test adapter
- Measurement devices



# TESTING

To ensure compliance with mechanical, electrical, and thermal performance requirements, all materials and systems undergo rigorous testing.

At VRI Composites and The Gund Company testing facilities, we perform material testing evaluations in accordance with IEC, UL, ASTM and other specifications.

- Thermal, electrical and mechanical aging tests
- Tan δ-measurements at different temperatures
- Partial discharge measurements with different voltage ranges



Testing Stations



Solutions

# INSTRUCTION

We offer unique, high-voltage insulation instruction. Though ever-evolving, our main objectives are:

- Better understanding of high-voltage insulation technology for rotating machines and up-to-date knowledge on insulating materials and systems
- Practical experience in the application of electrical insulating materials

# WE ENABLE ENERGY

VRI Composites and The Gund Company are suppliers of advanced materials and systems for electrical insulation and machinery. We also deliver high-performance solutions tailored to the needs of various high-tech industries.



## Mica

All materials related to high-voltage insulation. Our commitment to mica starts with mining and ends with finished tapes.



## System components

Producer of integrated and ready-to-install system components for high-voltage electric motors, railway drives and generators.



## Cables

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



## Composites

Engineered materials made from a resin and a support structure with distinct physical, thermal and electrical properties. We offer molded, machined or semi-finished products.



## Flexibles

Insulating flexible materials for low-voltage applications.



## Ballistic Protection

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



## Testing

VRI Composites provides electrical, thermal and mechanical testing of individual materials as well as of complete insulating systems.



## Instruction

VRI Composites provides instruction to customers in high- and low-voltage insulation solutions.



We focus on products and solutions for electrical power generation, transmission, storage and industrial applications. Our business portfolio is divided into the following markets: high- and low-voltage motors, transformers, switchgear, electronics, power generators, metals processing, electric vehicles, military, aerospace, oil/gas, medical and space.

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