FreiLacke

- Räder
  Wheels
- Fahrzeugbau
  Vehicle construction
- Maschinen- und Apparatebau
  Mechanical engineering
- Lohnbeschichter
  Job coaters
- Funktionsmöbel und Lagertechnik
  Functional furniture and storage technology
- Bau und Sanitär
  Construction and sanitary

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FreiLacke

Wind of Change – Freo**Wind**®

Systems expertise for wind turbines – from the foundation to the tip of the blades

Systematically.
Everything from a single source.

Humans have always used wind power: Whether it was to power sawmills or mills, to pump water from wells or to sail the seven seas. Nowadays, wind power is mostly used as an environmentally friendly method to generate electricity. During its service life, a wind turbine can generate 70 times more energy than is required for manufacturing, using and disposing of it. The way turbines are currently manufactured makes it extremely difficult to produce them more cost-effectively. That means new and innovative turbine solutions are needed.

The system concept has to be continued constructively

For its customers in the wind power sector, **Frei**Lacke is keeping coating systems for individual components – from the foundation to the rotor blades – in stock. **Frei**Lacke is extending this system concept far beyond coatings and is also advising manufacturers on the design and construction of individual components. As a leading system coatings supplier, FreiLacke can take advantage of its extensive raw materials competence and develop customer-specific application solutions.

Added value:

- System expertise
- Greater efficiency, improved profitability
- Process step improvements
- New process technologies
- Coating solutions
- Process expertise and support

- Powder coatings
- Industrial coatings
- EC
- Composites

The foundation and the (concrete) tower

Quality – from the base to the tip

In order to achieve an optimal foundation and concrete tower surfaces that are resistant against a wide range of weather conditions, we offer combinations of 2C epoxy resin primers and 2C UHS top coats. In addition, 2C filler materials are available for preparing the concrete surfaces.

All systems are nearly VOC-free and feature a large application window and reproducible coating results.

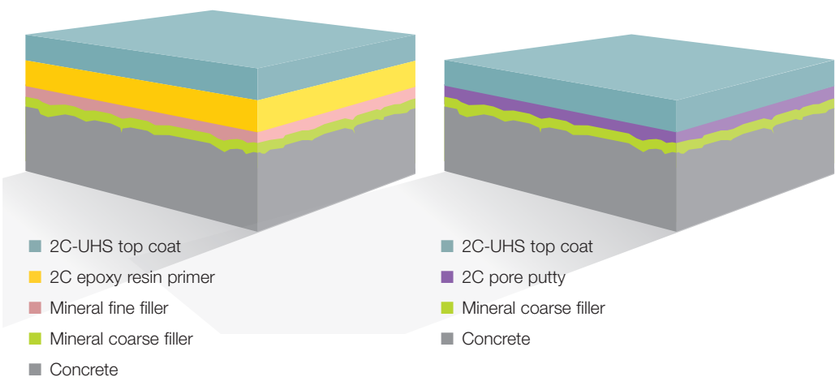
As a result of the outstanding concrete penetration behaviour of the primer, an excellent adhesive bond can be ensured. In addition, compatibility with newly produced concrete segments and filling compounds can be achieved.

Wind and weather resistance

Different customer requirements can be met thanks to the use of the 2C Ultra-High-Solid top coat. **The low-odour coating material can be applied effortlessly using a spraying process or a roller.**

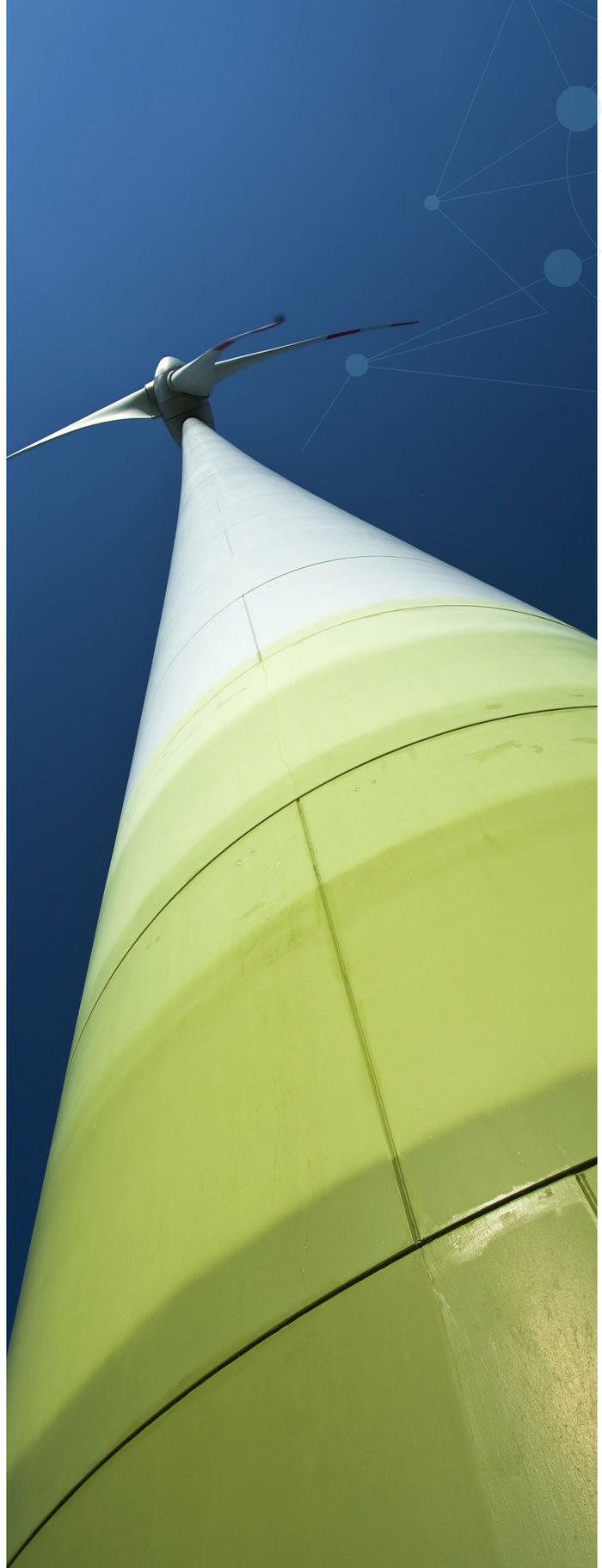
The system features an excellent initial water resistance and, after just a short time, offers a top mechanical resistance, which means that the time in production halls is reduced. As a result of the high alkaline resistance, the surface quality is retained even when it comes into contact with concrete slurries. Elastic variants are also available that can be used in case of increased crack-bridging requirements.

Layer structure example (comparison of two possible processes)



Technical data – 2C epoxy resin primer

Resistance	against moisture in combination with a **Frei**Lacke 2C-UHS top coat
Visible	pot-life end
Conditions for processing	from 5°C to 40°C, very wide humidity range
Adhesion	excellent, even on new concrete
Application	simple, using a roller
VOC	nearly completely free (< 1%)



Technical data – 2C UHS top coat

Conditions for processing	from 5° to 40°C and a very wide range with regard to humidity
Application	easy, using a roller, thanks to low roller resistance or using spraying
Surface structure	even (no streak formation)
Resistance to light and weather	very high
Application	also possible in a single layer to less burdened areas, also possible on concrete
Curing	cures quickly and therefore offers high scratch resistance
Transport suitability	good
VOC	nearly completely free (< 1%)
Overcoating	with itself, up to 5 days without sanding
Chemical resistance	good
Odour formation	moderate or pleasant when processing

The nacelle

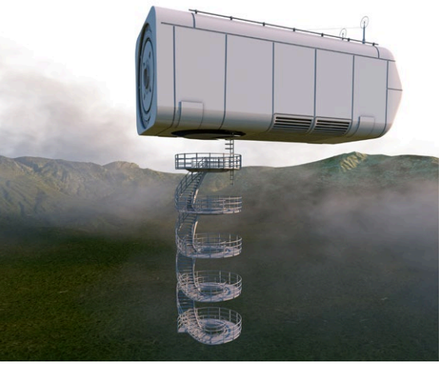
Exterior as well as interior

Inexpensive GRP components, which are manufactured as claddings using modular construction

These prefabricated components can be assembled on site or in the factory. The integration of installations such as weather stations is possible. Generally, the composite components consist of glass fibres, a matrix resin as well as a coloured gelcoat layer. Usually, styrene GRP systems are used.

The base materials are styrene-solved, unsaturated polyester resins. These have been used successfully for decades.

With regard to emission-reducing coating materials, PU/PUR as well as other innovative systems are used, which allows higher visual standards to be achieved.

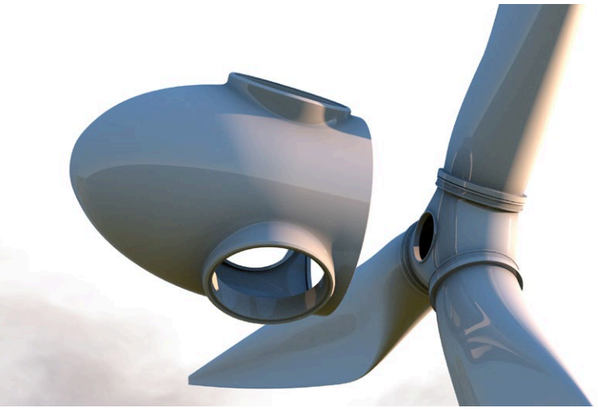


Technical data

Conditions for processing	at room temperature
Production process	Manual laminate or other production processes
Application	Brush, mechanical processing
Resistance to light and weather	Sufficient
Overcoating	possible with the proper coating
Chemical resistance	good

The hub and the generator

The centre



What products are used?
The area at the hub and the generator has a wide range of qualitative and process-related requirements.

For these coating tasks, we offer sophisticated wet and powder coating systems that can be used to optimise the respective processes.

Water-thinnable coatings
Clean energy starts with the selection of environmentally friendly coating systems. Depending on the requirement, single or multi-layer systems with our water-thinnable coating systems can be used.

High-solid and ultra-high-solid coatings
For all applications that require the use of organic solvents, our proven high-solid and ultra-high-solid coating systems with a solids content of up to 90% are available. The primers and top coats can be adapted individually to the requirements and coating processes.

Powder coatings and PiP
Many components are especially well-suited for coating processes using powder coatings. Top anti-corrosion results can be achieved with a two-layer coating consisting of primer and top coating.

In the case of large or heavy components, these have to be baked in layer-by-layer with conventional powder coatings. In order to reduce the energy demand for this system, we have developed the "powder-in-powder" technology. This technology excels because the powder top coating can be applied directly onto the powder primer without using an extra step to first bake it in. As a result, only a single baking process is required, which saves energy and valuable production time.

System coating
Regardless of the number of different coating systems, FreiLacke ensures an optimal optical result while meeting the specifications.

By coordinating the different coating formulations, optical aspects, such as colour shade, gloss and, where required, the surface structure of all parts assembled next to each other, also match very well.

The rotor blade and the blade tip

When things have to go round and round

FreiLacke **is the leading system coating supplier in targeted industry groups. Our strength lies in the development of application solutions.**

For the coating of rotor blades, this means that all coating materials, from the filler and pore filler to primers, gelcoats, top coats and erosion protection materials (LEP systems) are available.

All activities focus on the customer-specific requirements as well as the individual regulatory and climate-protection standards across the globe. That is why environmentally friendly high-solid and water-based top coating systems are available. This portfolio is complemented by VOC-reduced or VOC-free fillers, pore fillers and gelcoat materials.

Since the rain erosion resistance is one of the main requirements, we spend a lot of our developmental efforts on this area. The erosion protection values achieved by **Frei**Lacke, which have already been tested and positively evaluated by different institutes) as well as the helicopter test processes and the water jet process), are not just the result of a very good LEP system but are also due to the targeted coordination of the individual coating materials.

In order to guarantee the performance of coating systems even during the ongoing operation of the wind turbine, tests such as rain erosion tests are conducted – both without stresses as well as following cyclical stresses (UV, climate change and salt water stresses). Some of these development processes were created in cooperation between **Frei**Lacke and different testing institutes and bodies in the form of industry projects.

Special features of the LEP system:
During the development of LEP, a special emphasis was placed on ensuring that it features a large application window and does not react to changing ambient conditions during processing. An easy application forms the basis for the developments. In the end, taking into account all of these requirements, a system was developed that does significantly better in the rain erosion test than currently available LEP systems. It is being optimised all the time in order to improve its performance even further.

Blazing new trails

A new path toward composite production – **Frei**Lacke has worked extensively on preserving resources and, as a result, optimally combines the various disciplines of the production of composites. Composites are multi-component mixtures consisting of different materials. The optimal coordination of adjacent components is not only a focal point of the coating of concrete towers, but also the production of rotor blades. At **Frei**Lacke, all coating systems can be found under a single roof and are supplemented by innovative powder-resin systems.

Which products are used? The consistent implementation of the system approach is also reflected in the manufacture of composite components, such as rotor blades. The unique CM powder-resin systems allow new production processes for small and medium-sized rotor blades that practically operate independently of climate conditions.

The systems do not require any solvents and therefore form a sustainable and health-friendly basis for processing. The powder-resin systems are matched to the other coating systems and offer optimal adhesion.

The systems can be combined efficiently which allows for a sharp reduction of time-consuming process steps. Sustainability is very important to us, not only with regard to the environment but also our products and employees.

Due to our environmentally friendly products, we help protect the environment not only during our production process but also when recycling wind turbines.

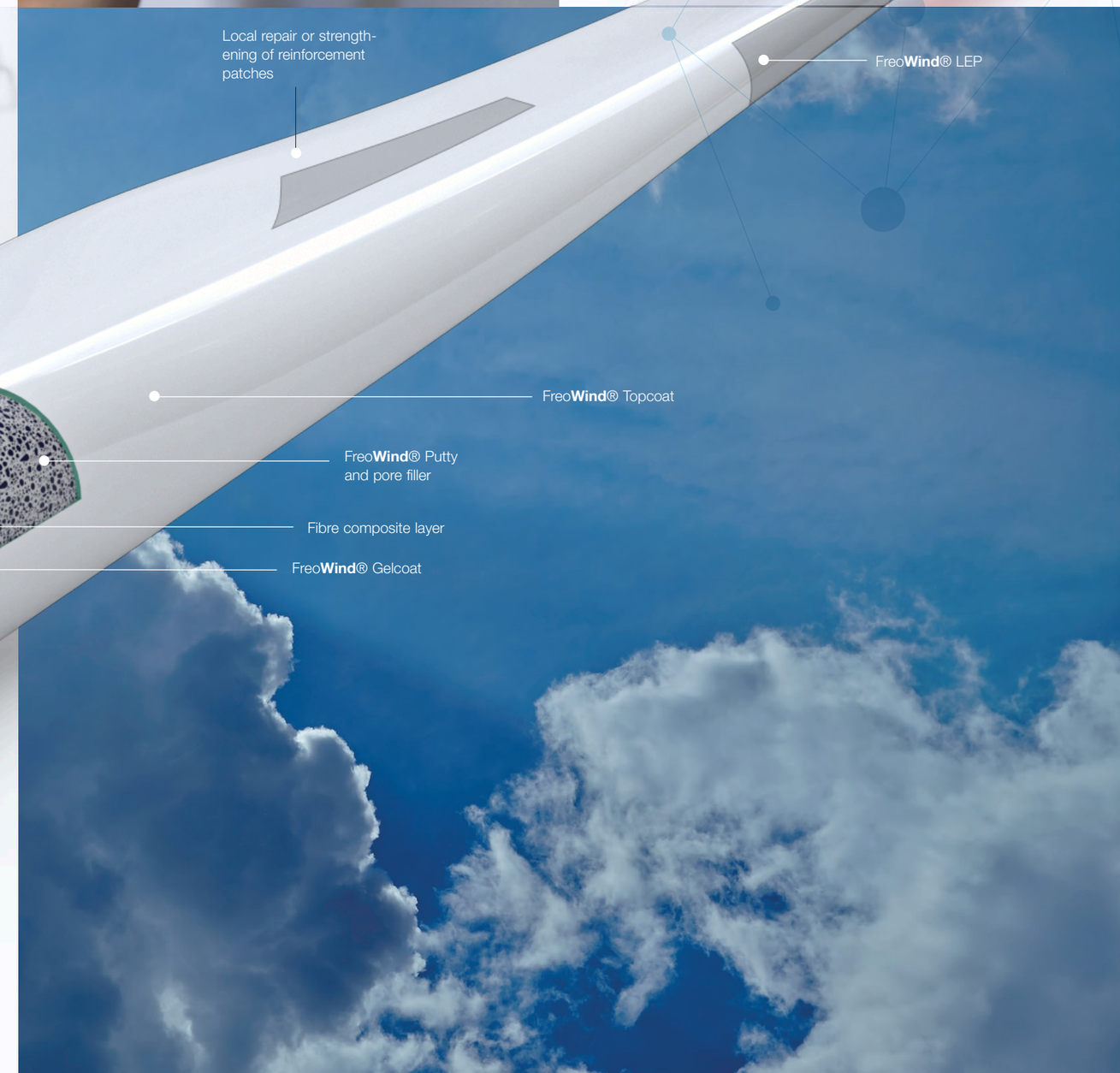
This also benefits employees in the production department who work directly with the products.

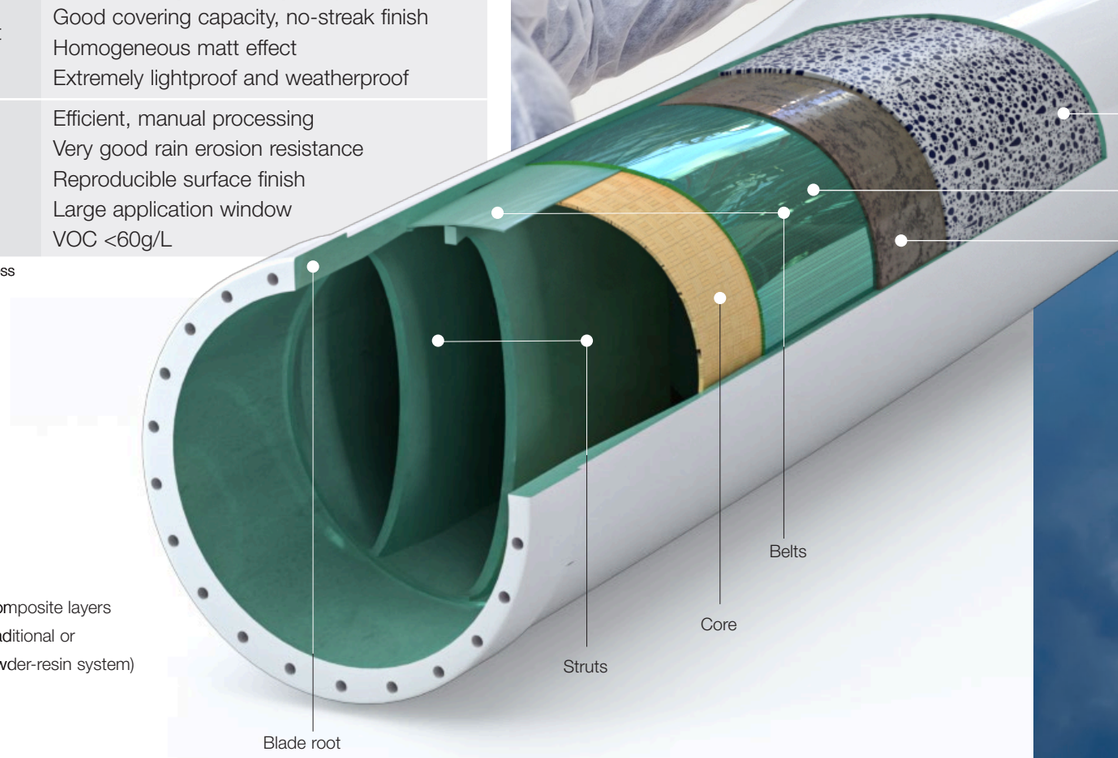
Quality – layer upon layer!

FreoWind® – System solutions for blades

FreoWind Gelcoat transparent	Short process times Good adhesion to matrix resin Temporary light and weather resistance.
FreoWind Putty	Variably adjustable processing time Efficient grindability, low abrasiveness Low-pore finish Good rain erosion resistance
FreoWind Pore Filler	Easy processability Great coverage performance Good filling capacity
FreoWind Topcoat	Water-borne system, nearly completely VOC-free Good covering capacity, no-streak finish Homogeneous matt effect Extremely lightproof and weatherproof
FreoWind LEP	Efficient, manual processing Very good rain erosion resistance Reproducible surface finish Large application window VOC <60g/L

*regardless of layer thickness





Fibre composite layers (with traditional or CM powder-resin system)

No matter from where the wind blows

Global market, local presence

Systematicsolutions.

FreiLacke has stood for innovative paints and coatings since 1926. The family-owned company has already entered its third generation and develops customised solutions for clients from the wheel and vehicle manufacturing industries, as well as those in the fields of mechanical and apparatus engineering, job coating, rail vehicles, wind power, functional furniture, storage technology, construction and sanitation, directly through its 600 employees at its Döggingen base in the Black Forest.

As a modern family-run company now in its third generation, the safeguarding of the head office is just as important as our worldwide sales and our international subsidiaries and partners.

The product range of Europe's leading system coating provider covers the entire spectrum from industrial coatings, powder coatings and electrodeposition coatings to composite solutions.

International sales are handled by a global network of subsidiaries and partners around the world. Environmental protection has always been a key priority for **Frei**Lacke. Therefore, the company makes every effort to develop environmentally friendly products, reduce emissions, packaging materials and waste and use resources sparingly. Current **Frei**Lacke certifications (EMAS, IATF 16949, ISO 9001...) can be viewed at www.freilacke.de.

In 2019, **Frei**Lacke was honoured as one of the top 100 employers in Germany in the “Great Place to Work” competition and attaches great importance to training with a quota of 10%.