ROCKWOOL®

CORE SOLUTIONS

Fibre-innovations: Engineered for Automotive Friction

Lapinus® Mineral Fibres for Braking Performance

ROCKWOOL®

Core Solutions and mineral fibres

At ROCKWOOL Group, we are committed to enriching the lives of everyone who comes into contact with our solutions.

Our expertise is perfectly suited to tackle many of today's biggest sustainability and development challenges, from energy consumption and noise pollution to fire resilience, water scarcity and flooding.

Our range of products reflects the diversity of the world's needs, supporting our stakeholders in reducing their own carbon footprint along the way. Stone wool is a versatile material and forms the basis of all our businesses. With approx. 12,700 passionate colleagues and sales in more than 120 countries, we are the world leader in stone wool solutions – from building insulation to acoustic ceilings, external cladding systems to horticultural solutions, engineered fibres for industrial use to insulation for the process industry and marine & offshore.

At ROCKWOOL Core Solutions, we work hand-in-hand with friction material producers to develop solutions using Lapinus® products that address concrete performance needs. Our strength lies in combining material science and engineering with practical manufacturing know-how: and our global network of representatives supporting our customers in development projects. Projects from initial concept to full-scale production. Our mineral fibres ensure thermal performance, acoustic behaviour and mechanical durability that meets customer and statutory requirements. We offer local support, fast technical response and reliable global delivery.

CORE SOLUTIONS

50+ countries

70+ colleagues

25+ dedicated sales representatives

30+ years in the OEM business

ROCKWOOL®

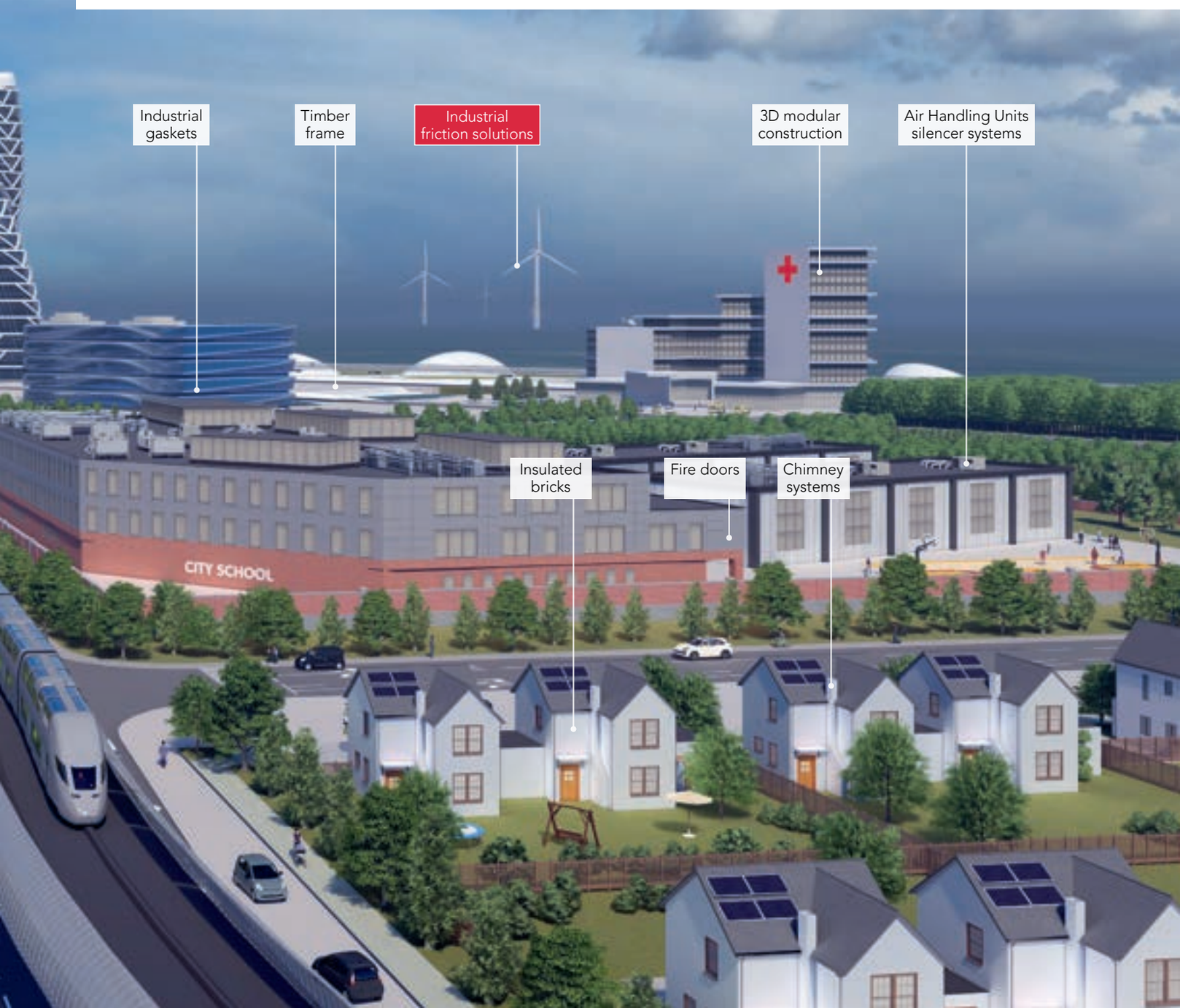
Welcome to our World

CORE SOLUTIONS

At Core Solutions, we offer premium quality mineral fibres and stone wool materials, along with strong technical support for OEMs and the friction industry.

We go beyond being raw material supplier by researching the functionalities of our products together with other materials in the friction matrix. Rise to global challenges for friction, our team has continuously driven innovation for better solutions together with our customers. Rooted in sustainability, our certified biosoluble products contribute to shaping a better world for today and tomorrow.

- **Leadership** Backed by over 85 years of ROCKWOOL expertise, our specialised mineral-fibre know-how makes us a trusted global authority.
- **Innovation** We continuously innovate through specialised expertise and focused R&D investments.
- **Sustainability** We promote sustainable solutions that support people, the planet, and long-term circularity.
- **Reliability** We deliver consistently high quality, flexible and seamless logistics, and dependable long-term-stability as an A-rated supplier.



Made from natural stone

Our purpose: Release the natural power of stone to enrich modern living.

Stone wool is made from volcanic rock and provides a durable solution that meets these needs. It boosts energy efficiency by reducing heating and cooling costs of the building life. Its non-combustible nature and resistance to temperatures up to 1,000 °C help slow the spread of fire, while its water-repellent properties prevent moisture buildup and reduce the risk of mould and mildew.

With a lifespan of at least 55 years, stone wool offers lasting performance. Versatile and infinitely recyclable, it supports sustainable building practices and enhances both safety and comfort.

- **Ensure safety** All our products are made from natural stone and are biosoluble. They are safe for humans and the environment.
- **Reduce fine dust emissions** Friction formulations reducing wear of car brakes contribute to a reduction of fine dust emissions.
- **Reduce noise** Car brakes that produce less noise and fences that reduce ambient noise result in a healthier society.
- **Disseminate knowledge** We generate knowledge and share it with our stakeholders to help solve their challenges.

Sustainability is central to our business strategy

Our aim is to turn sustainable development challenges into business opportunities by developing innovative, safe products that address some of the most significant societal challenges of our time. As a durable, recyclable, non-combustible, and versatile material, stone wool forms the basis of our business. Sustainability is the foundation that underpins the ROCKWOOL business model and value chain.

Since 2016, ROCKWOOL has been aligned with the United Nations Sustainable Development Goals (UN SDGs) framework. Drawing on extensive consultation with both internal and external stakeholders, we have prioritised 10 of the 17 SDGs. This was confirmed by the double materiality assessment. Gender equality (SDG 5) and Peace, justice and strong institutions (SDG 16) were added in 2024. We have targets related to gender equity and a target for the ratio of active employees in at-risk functions who received Code of Conduct training.

Are you looking for more information?
Don't hesitate to fill in this form, and our team will get in touch with you as soon as possible!

ROCKWOOL mineral fibres: ideal for friction

Our Lapinus® products give mechanical strength to the brake pad, and contributes to the plateau formed on the pad surface during braking. Our fibres help to improve wear and noise performance as well as stabilizing friction levels under different conditions.

The performance of friction materials depends on the synergy between all raw materials. Our mineral fibres contribute to the mechanical and tribological performance of brakes.

- **Heat resistancy >1000 °C**
- **Certified biosoluble – made from natural stone**
- **Increasing comfort by reducing noise, vibrations and harshness (NVH)**
- **Improving durability and decreasing fine dust emissions by decreasing wear**
- **Enhancing safety by stabilising friction level**

Where our mineral fibres are applied

Automotive

It is without doubt that brake systems are among the most important safety components in passenger cars and commercial vehicles. They must be able to stop a vehicle under any circumstance. For this reason, it is crucial to have a friction material which can function under extreme conditions. For many years our mineral fibres have been used in automotive friction materials (disc pads and linings) to improve comfort, safety and durability.

Railway

With an increased focus on comfort and noise, the railway industry globally is moving from cast iron blocks to composite friction materials. Our mineral fibres are used widely in these composites, which allow the friction material (railway blocks and pads) to perform under extreme braking conditions.

Industrial applications

Industrial equipment, such as windturbines and elevators, are equipped with various brake systems for safe operation. Our mineral fibres are used in industrial friction materials to increase efficiency, lower the cost of ownership and minimize down-time.

What are the global trends and challenges

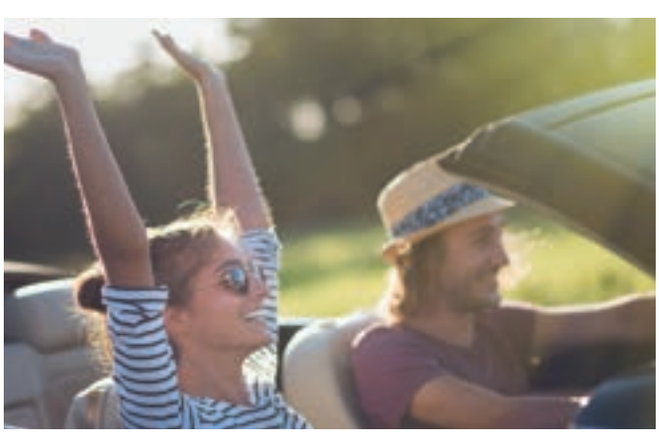
The evolving demands on friction technology

The friction industry faces a complex convergence of trends: electrification, strict CO_2 and PM emission regulations, and the need for enhanced comfort. This requires innovative material science to ensure performance, safety, and sustainability on global vehicle platforms.

Together these trends create complex technical and regulatory challenges. Our combination of material science, laboratory validation and production expertise helps friction material producers convert those challenges into reliable, compliant and sustainable braking solutions.

Comfort

Evidence shows that 40 % of European citizens experience annoyance from traffic noise.[1] So improving NVH performance is a top priority for the industry. We work with friction material compounders to reduce NVH through material formulation, mineral fibre solutions and validated bench and vehicle testing so drivers and passengers can enjoy quieter, more comfortable rides.



Non-exhaust PM Emissions

As tailpipe emissions fall thanks to stricter regulations and electrification, non-exhaust sources have become the dominant contributors to traffic particulate matter. Non exhaust sources account for more than 90 % of PM10 and 85 % of PM2.5 from traffic,[2] and up to 55 % of non-exhaust PM10 in urban areas is attributed to brake wear.[3] Our mineral fibres help reduce particulate generation at source while maintaining braking performance and durability.

Electrification

Tighter CO_2 targets and lower fossil fuel use are accelerating the shift to electric vehicles. By 2030 electrified vehicles could represent as much as half of new vehicle sales.[4]
The move to heavier battery packs and regenerative braking changes braking demands, requiring materials that manage heat effectively, resist corrosion and deliver predictable performance, NVH, over longer service cycles. We support these needs with high temperature stable mineral fibres.

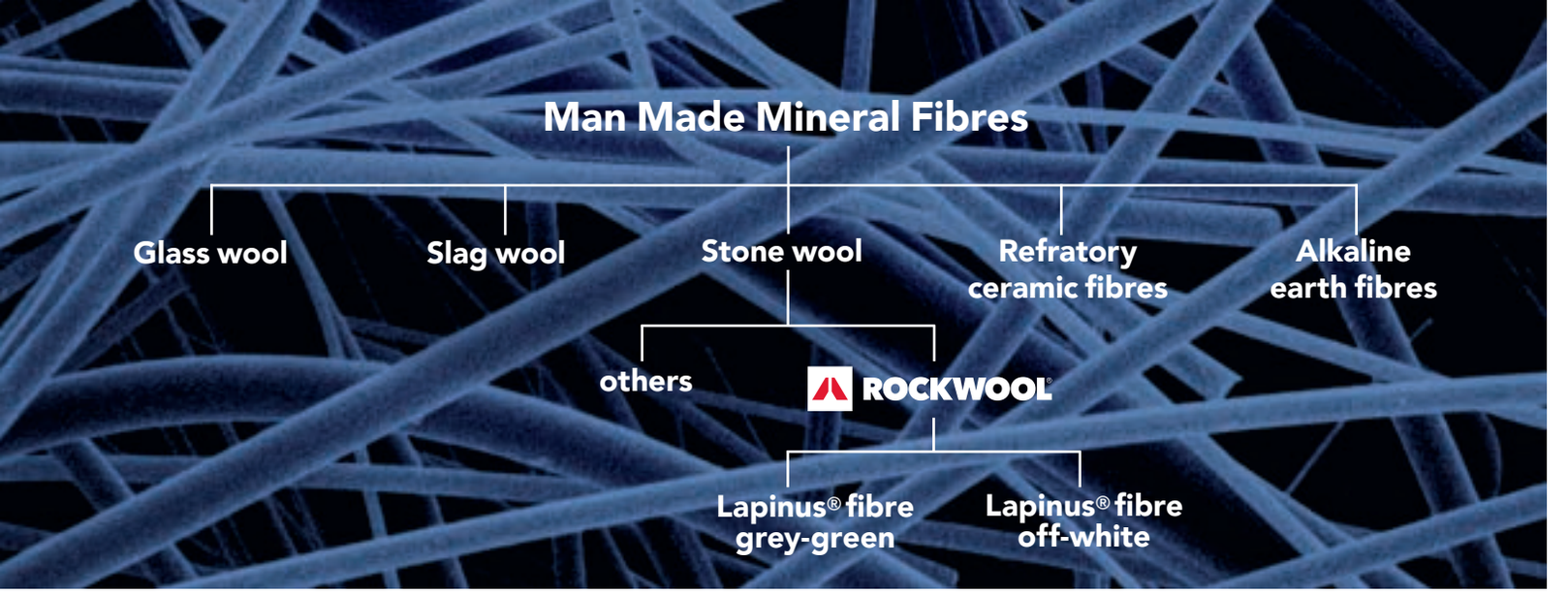
ROCKWOOL Core Solutions offers high-performance mineral fibres that complement friction formulations to be compliant with evolving regulatory standards.

Health, Safety & Sustainability

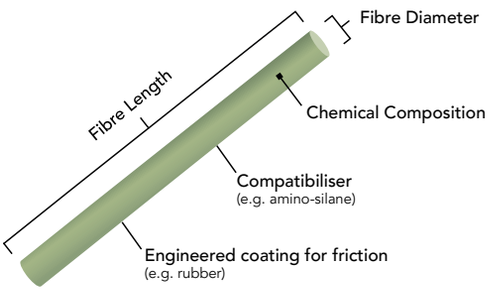
With growing attention to health and safety, traditional raw materials face new scrutiny and limitations. The industry needs innovative substitutes that perform reliably under extreme braking while reducing potential health risks. Our mineral fibres are certified bio-soluble and carry both EUCEB and RAL certifications, ensuring they meet stringent health and safety standards. Produced with up to 40 % recycled material, they act as a sustainable, high-performance reinforcement in friction systems, enabling safe formulations that meet modern regulatory and customer expectations.

Global platforms

The trend toward global vehicle platforms calls for one braking solution that balances performance, comfort and manufacturability across multiple markets and vehicle platforms. Our global network of application experts and our cooperation with external partners like universities and test centres provides academic results enabling us to share this knowledge with key stakeholders in the industry.



How mineral fibres are engineered



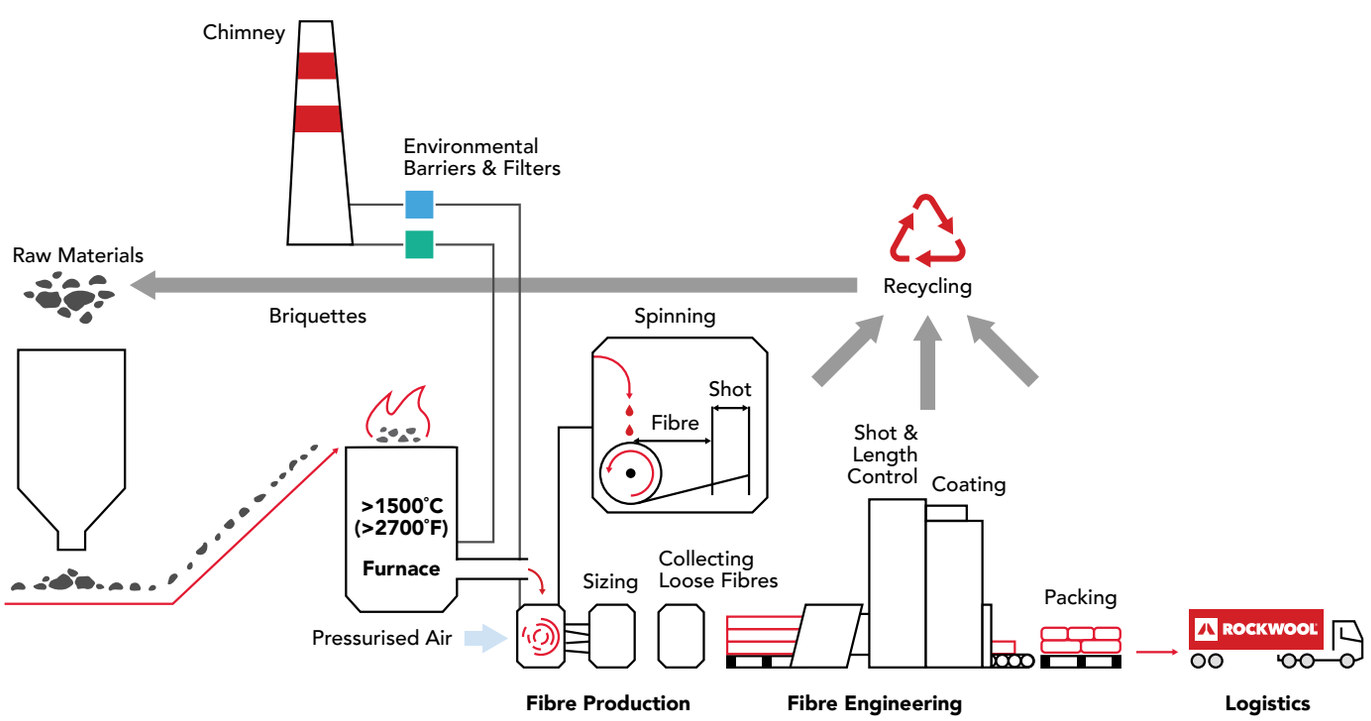
Safe, inorganic fibres

Think of stone transformed into performance. We melt natural volcanic rock and selected minerals at 1,400 –1,600°C and spin the melt into resilient fibre.
The result is a mineral fibre with high thermal stability, mechanical strength and recyclability. Ideal for demanding applications such as automotive friction materials.

In brake pads, the mineral fibres manage and dissipate heat, reduce fade, improve NVH, help limit particulate release and ensure stable, repeatable performance throughout vehicle life.

Sustainability is built in. Our mineral fibres contain recycled content and are produced under strict environmental controls supporting circular material flows.

Regulatory demands continue to rise. Standards like Euro 7 tighten limits on tailpipe and non-exhaust emissions and require greater durability. Validated stable quality raw materials, rigorous testing and controlled production are therefore essential. We combine material science, laboratory validation and testing to help friction material producers meet these regulatory and sustainability challenges.

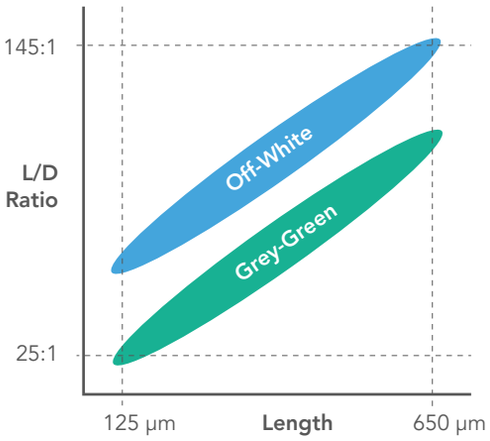


Precision-engineered mineral fibre

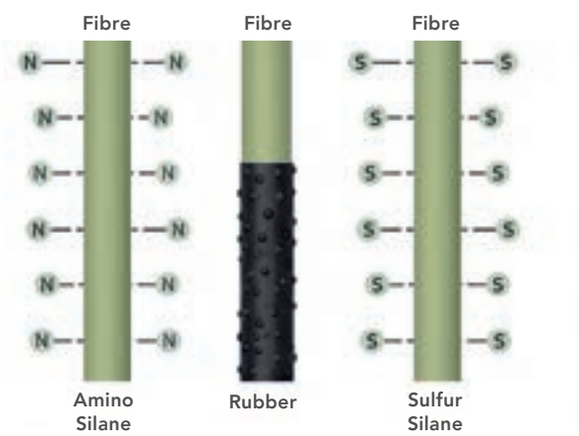
With more than 35 years of expertise in producing mineral fibres for the friction industry, we have developed the technology to adapt the following fibre parameters to meet the differing needs of friction formulations.

Increased dimensional stability.

Our fibres have a high aspect ratio for increased dimensional stability. We produce fibres with L/D ratios from 25:1, up to 145:1



The unique features of our mineral fibres

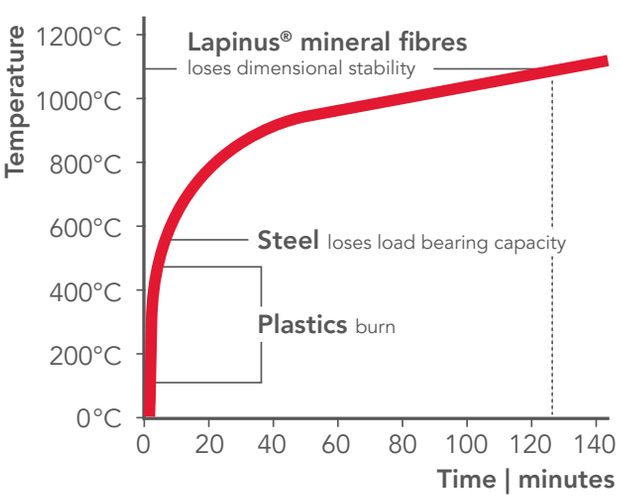


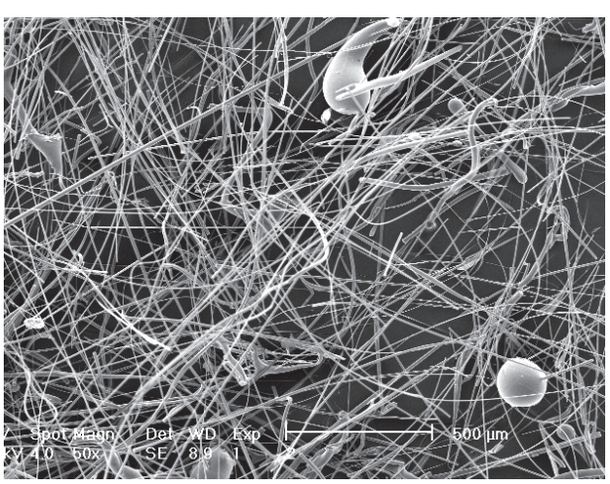
Surface treatment

Compatible to different binder systems. We are able to put a variety of surface treatments on the fibres. This can be an adhesion promotor, surfactant, or even a rubber layer. With the different surface modifiers, we can engineer the fibres for a range of binder systems and applications.

High temperature resistance

We keep cool when things get hot. All Lapinus® products are inorganic and can withstand high temperatures up to 1000 °C.





Precision shot control

Non-fibrous particles. During the production process a small part of the melt is turned into non fibrous particles called "shot". During our fibre engineering production process, we can reduce the shot-content and keep it stable at a level as low as 0.1 % by weight.

How mineral fibres work

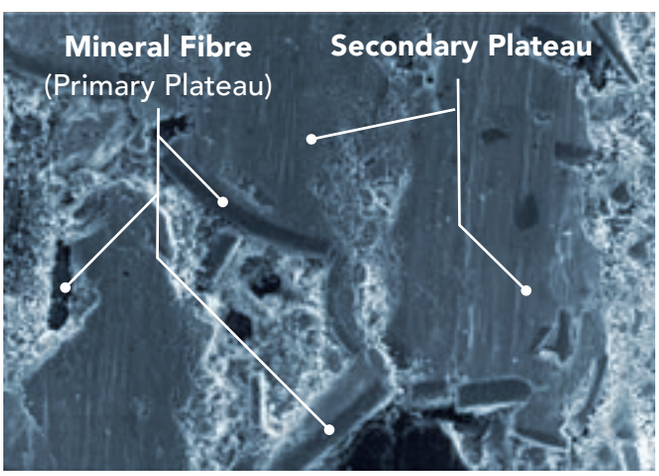
The working mechanisms of our mineral fibres

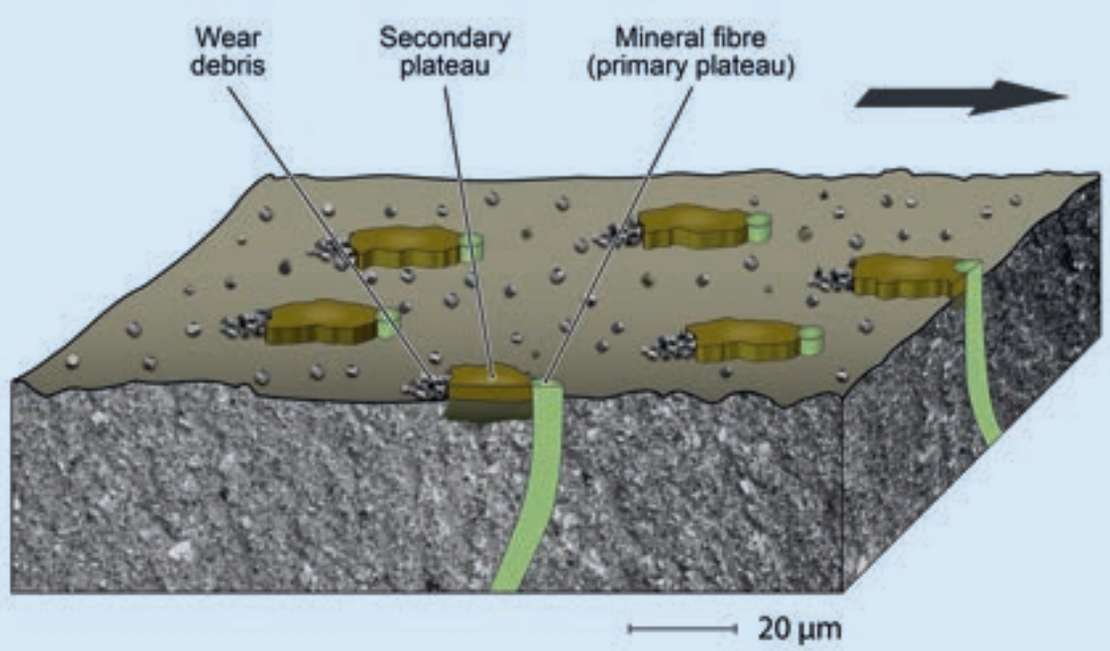
Braking results from the surface interaction between the rotor and the friction material. The formulation of this material – typically composed up till 10–20 raw material – has a decisive impact on performance. Each raw material has its own chemistry, size, and shape, and therefore a distinct function.

Mineral fibres are a key component in friction materials. They complement other raw materials. They can also be engineered to contribute specific tribological properties. Ultimately, the friction material performance depends on the synergy between all raw materials in the formulation.

Anchoring Effect

During braking, high shear forces act on the friction surface, creating wear debris. Mineral fibres in the friction layer act as a Primary Plateau. In front of these fibres, debris accumulates into a Secondary Plateau. Together, they create a Third Body Layer that ensures stable braking performance. More fibres increase the number of anchor points, enhancing this effect.[5]

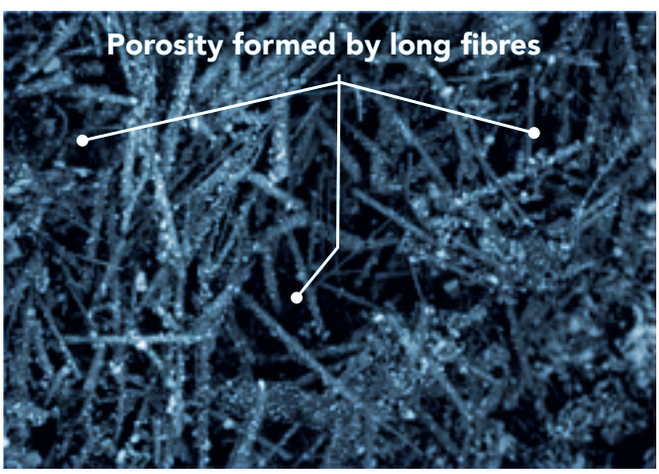


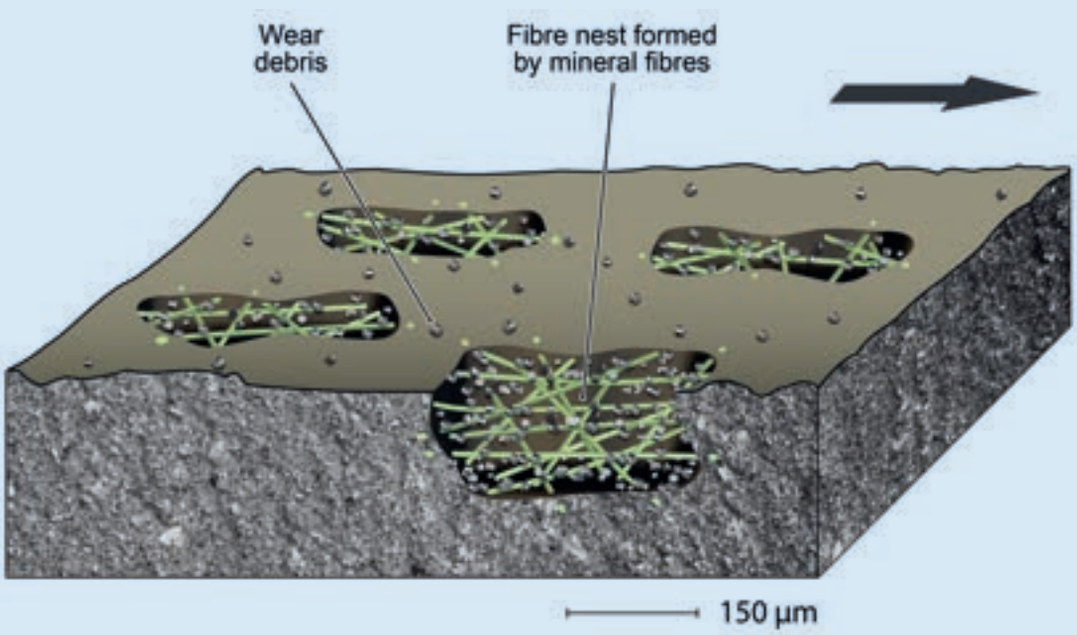


A stronger Anchoring Effect increases the contact area. When well-balanced in the formulation, multiple secondary plateaus reduce wear and NVH, resulting in a more stable braking performance.

Reservoir Effect

Long mineral fibres can create fibre nests that form voids within the friction matrix. When these reach the pad surface, wear debris accumulates inside them. These voids act as reservoirs, which increase contact area and improve friction stability. At the same time, they serve as damping zones, helping to reduce noise during braking and wear.[6]





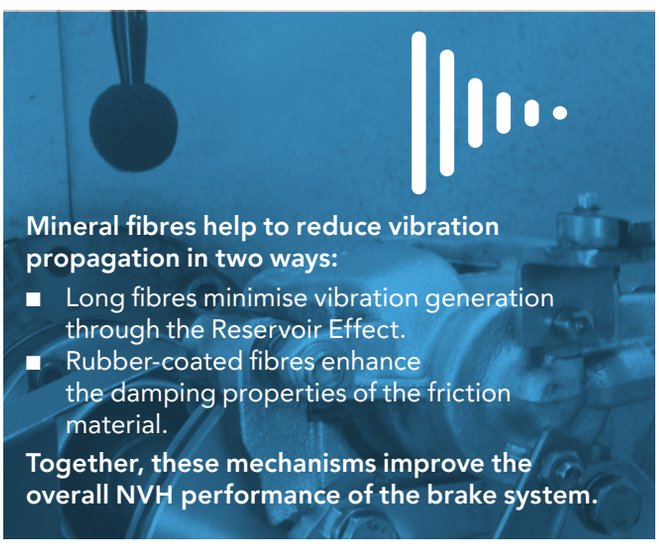
The Reservoir Effect has a positive influence on friction level stability, wear and NVH reduction.

Lapinus® Fibres: Controlling Friction Performance

By engineering the different fibre parameters, Lapinus® fibres deliver superior damping and contribute to reinforcing the friction material.

Damping

Noise is a result of vibration propagation. To reduce the propagation of vibration, friction formulations must contain materials with damping properties or they should be able to generate frequencies outside the audible range or beneath the critical noise decibel level.



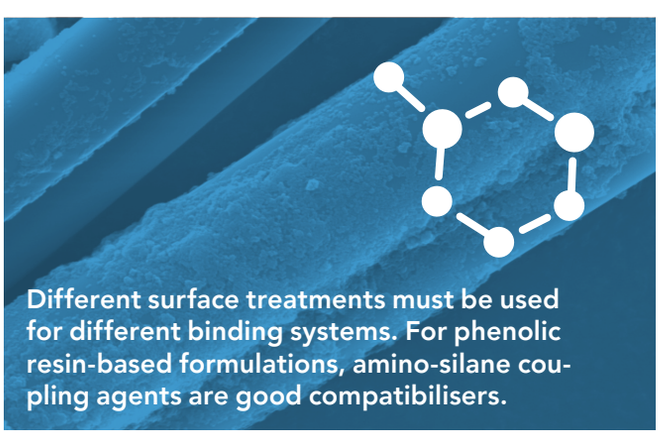
Mineral fibres help to reduce vibration propagation in two ways:

- Long fibres minimise vibration generation through the Reservoir Effect.
- Rubber-coated fibres enhance the damping properties of the friction material.

Together, these mechanisms improve the overall NVH performance of the brake system.

Bonding

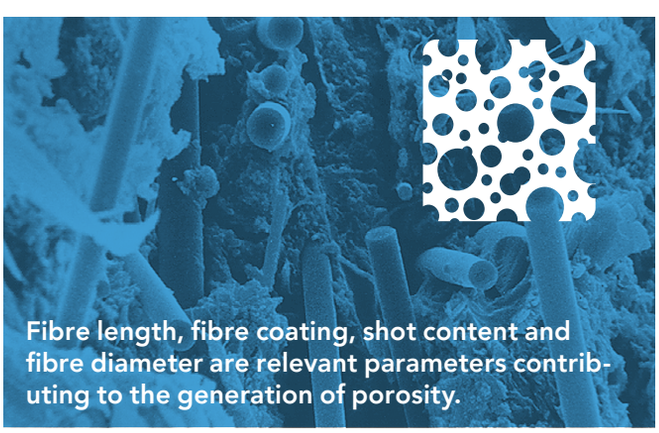
Adding fibres to a composite increases its strength. To optimise fibre–matrix bonding, the binders must form chemical attachments to the fibre surface. This can be further improved through surface treatment with a suitable coupling agent.



Different surface treatments must be used for different binding systems. For phenolic resin-based formulations, amino-silane coupling agents are good compatibilisers.

Porosity Contribution

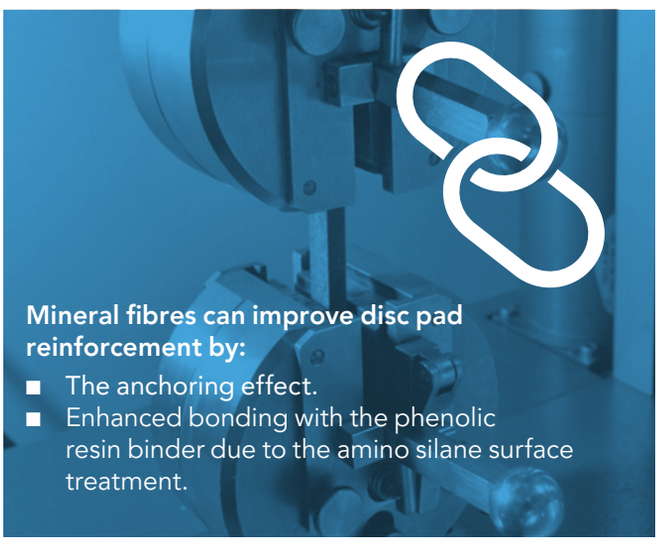
Porosity in friction materials is being formed during the molding process. Its amount and distribution significantly influence thermal conductivity, damping, friction stability, wear, and NVH performance.



Fibre length, fibre coating, shot content and fibre diameter are relevant parameters contributing to the generation of porosity.

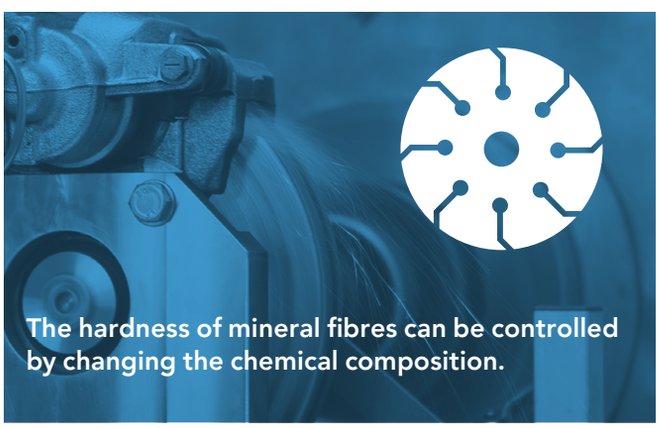
Surface Reinforcement

Mineral fibres allow all the functionalities needed in friction materials to be maintained under heavy loads of pressure, temperature and mechanical stress.



Mineral fibres can improve disc pad reinforcement by:

- The anchoring effect.
- Enhanced bonding with the phenolic resin binder due to the amino silane surface treatment.



The hardness of mineral fibres can be controlled by changing the chemical composition.

Abrasiveness

Lapinus® mineral fibres are supplied in two chemistries. Our off white grades offer a lower hardness compared to the grey green chemistry.

Learn more about mineral fiber interactions in brake systems:

Great Expertise and extensive Support

Core Solutions is the thought leader in engineered ROCKWOOL mineral fibres for friction applications. We translate material science into real world braking solutions through deep laboratory validation, pilot scale testing and close collaboration with OEMs.

We manufacture Lapinus® fibres and and engineer the fibres properties in order to meet specific performance goals. Our laboratories perform material characterization and prototype trials to demonstrate thermal stability, wear and friction behaviour. Using a friction pilot plant equipped with NVH dynamometer and Krauss machine, we produce a full size detailed NVH (Noise, Vibration, Harshness), thermal and wear data that helps us stay ahead in the technology development curve. Our dynamometer is equipped with a particulate matter measurement device in order to be ready for Euro 7 developments.

Our dedicated team actively participates in major friction forums and continuously expands its expertise. By tracking global trends and listening to friction material producers we identify the market demands and convert them into practical developments.

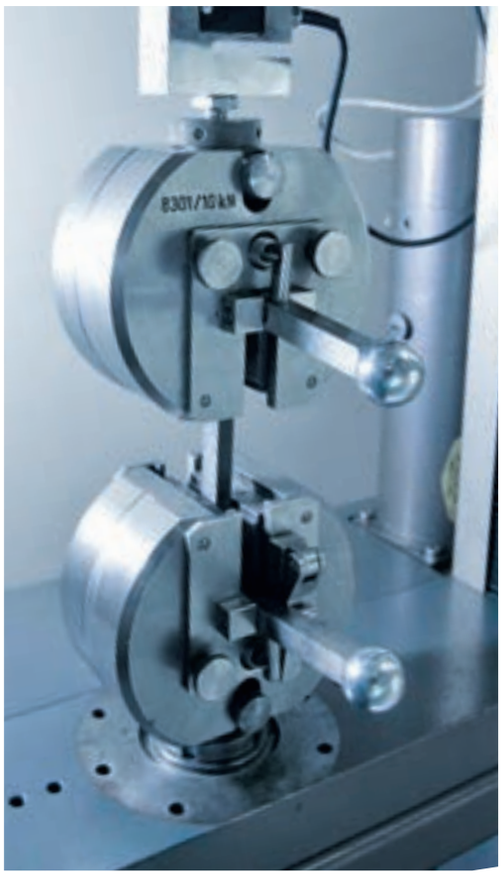
We focus on major market requirements like: comfort and NVH reduction, non-exhaust particulate emissions, corrosion, electrification, health and safety and global platform harmonization.

Sustainability and safety are built into our approach. Lapinus® certified bio-soluble mineral fibres can contain up to 40% recycled materials.

Discover how ROCKWOOL Core Solutions can help you meet performance, regulatory and sustainability goals. Contact us to arrange a laboratory visit, pilot plant demonstration or a technical collaboration.

Are you looking for more information? Contact us under:

coresolutions.rockwool.com/contact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