KOOCOO
AFUrail
Smart. Strong. Safe.

AFUrail
since 2005

The Company

Founded in 2006 by Dr Günther Koller, **koocoo technology & consulting GmbH** stands for innovation in the railway sector. As early as 2007, koocoo introduced **synthetic railway** sleepers made from advanced polymer composites into practical application – what was once a niche solution has since become a recognised **European standard**. What began in Austria has been driven forward by koocoo and adopted across Europe.

Today, koocoo is active in all major European railway markets – from Scandinavia and the UK to Spain, Italy and Central Europe. Beyond Europe, the company has also made a lasting impact in Russia, Canada and the United States.

Since 2025, koocoo has held the exclusive European distribution rights for a next-generation composite sleeper, made from polyurethane and continuous glass fibre – engineered in China to the highest industrial standards. A product that redefines performance.

Noise & Vibration – koocoo reduces what others merely measure

Since 2008, koocoo has also been a trusted partner in the field of railway noise and vibration mitigation – with proven, field-tested solutions. Web-mounted rail dampers, which reduce noise at the source, have been refined and rolled out across Europe with koocoo's expertise.In addition, koocoo supports the implementation of resilient track components that significantly reduce structure-borne sound and vibration. Less noise. Less vibration.

Improved quality of life along the rail corridor.

Focus: Innovation in the niche

koocoo rethinks railway technology – with a clear focus on smart, sustainable solutions in technological niches. The company is today recognised as a specialist in forward-looking rail infrastructure, helping to shape a quieter, more durable and future-ready railway system.

Know. Now. how

AFUrail – A New Era in Railway Infrastructure

In the 1970s, a ground-breaking innovation emerged in Japan: the composite railway sleeper, born from a close collaboration between the national railway and a leading high-performance polymer manufacturer. Inspired by the fibrous structure of wood, this sleeper combines continuous longitudinal glass fibres with a durable polyurethane matrix, manufactured in various profiles and lengths using the pultrusion process.

In China, this construction principle – continuous glass fibres embedded in a polyurethane matrix – has been systematically refined and optimised. The result is **AFUrail** – Advanced Fibered Urethane, a high-performance composite sleeper that combines durability, sustainability, and cost-efficient production in one advanced solution.

Since 2008, this technology has been successfully deployed across China's railway system – from high-speed lines and urban transit networks to heavy-duty freight corridors. It has proven itself as a true engineering success story.

Performance Meets Practicality

AFUrail is:

- Potable water compliant
- Self-extinguishing in case of fire
- As easy to cut and handle as wood

But unlike timber, **AFUrail** withstands extreme weather and environmental exposure without degrading.Thanks to its closed-cell structure, it absorbs no moisture and is fully resistant to oils, lubricants, and contaminants typically found in rail operations and logistics hubs.

Engineered in China – Ready for the World

Through decades of strategic investment, China has become a global leader in railway technolgy – **building the world's largest high-speed rail network, now exceeding 40,000 kilometres**. As domestic markets mature, the focus is shifting outward.

AFUrail is now available to railway operators worldwide – a proven, reliable, and economically attractive solution built on decades of field experience and industrial innovation.

Smart. Strong. Safe

Testing & Certification

Since its market introduction in 2005, the material has undergone extensive testing, initially based on established Japanese industrial standards. From 2019 onwards, it was subject to comprehensive evaluation in accordance with ISO 12856:2014, followed by a full test series completed in 2023 under ISO 12856:2020–2023 (Parts 1–3).Today, a complete and fully standard-compliant data set is available, meeting the latest international norms. A summary of the key performance indicators can be found in the attached table.

Benchmark Performance – Superior to Hardwood

The results speak for themselves:
When compared to oak timber, the traditional sleeper material in Central Europe, the composite demonstrates equivalent – and in many aspects superior – performance, particularly in terms of:

- Durability
- Deformation behaviour
- Load-bearing capacity

These outstanding properties enable not only safer and more elastic load distribution within the sleeper itself, but also optimise force transmission via fastening systems in bridge applications – especially on open steel bridges.

This makes **AFUrail** a clear advantage for demanding, high-load rail environments.

Proven Technology – Optimised for Modern Demands

AFUrail is based on a well-established construction principle: continuous glass fibre reinforcement embedded in a high-performance polyurethane matrix.
This technology has proven itself in rail infrastructure around the globe for decades. With optimised material composition and advanced production processes, **AFUrail** offers performance on par with – and in some areas exceeding – traditional composite sleeper technologies. Existing engineering principles and design standards can be applied, provided technical equivalence is established.

Timber-like Workability – Superior Weather Resistance

AFUrail can be handled and processed using standard timber tools and methods, while offering significantly improved resistance to weather, moisture and environmental stress in daily rail operations.
The result: a durable, robust sleeper system that delivers both structural reliability and long-term performance – in the workshop and on the track.

Compliant. Tested. Reliable.

The failure values provided herein are mean values based on 3 to 5 test specimens per test, as documented in SGS test report IN-SC-5801-23057-01 dated 14 July 2023. The tests were conducted in accordance with ISO 12856 Parts 1–3, EN 13146-10 and EN 13146-5

Properties	unit	oak	AFUrail
Density	[kg/m3]	800,00	845,00
Bending strength	[MPa]	95,00	116,00
Young's modulus	[MPa]	10 000,00	9 500,00
Compressive strength parallel to the fibre direction	[MPa]	53,00	72,00
Compressive strength perpendicular to the fibre direction	[MPa]	7,50	10,20
Shear strength	[MPa]	12,00	10,70
Bonded shear strength	[MPa]	8,00	9,60
Pull-out force of sleeper screw – China	[MPa]	35,00	60,30
Water absorption	[%Vol	70,00	0,16
Coefficient of thermal expansion	[10^{-6}/°K]	5,00	8,51
Electrical resistance (dry)	[Ω]	1×10^{13}	$4{,}05 \times 10^{14}$
Breakdown voltage under AC stress	[kV]	15,00	35,07

Oak reference properties according to Holz vom Fach, Hugo Kämpf, standards DIN 52188, DIN 1052, DIN EN 60243-1 and TU Munich test report No. 1687.

Table 1: Mechanical Properties at Failure – AFUrail

Table 1 shows the failure values of **AFUrail.** These values are provided for general information only and are not approved for structural design calculations.For binding design values and material safety factors, please contact us directly.

Bridge Applications

Open steel bridges over waterways pose unique challenges for sleeper materials: Significant temperature fluctuations between day and night, along with differing moisture exposure on the upper and lower surfaces of traditional wooden sleepers, often lead to a drastically shortened service life – unless special protective measures are taken.

AFUrail offers a decisive advantage in such applications: The material is virtually impervious to weathering and fully compliant with potable water standards. This means that rainwater and other environmental influences have no adverse effect on the water quality of the surrounding ecosystem.

Another key benefit is the precise pre-fabrication of sleepers in the factory. Each unit is manufactured to exact specifications, individually numbered, and delivered directly to site. On request, all necessary modifications – such as drilling, milling, height compensation and anti-slip surface treatments – are completed in advance.

As a result, on-site work is significantly reduced: The sleepers only need to be professionally installed – and the track superstructure can be mounted immediately thereafter. This reduces both construction time and associated costs.

In ballasted bridge decks, the system also offers high lateral resistance, ensuring stability even under heavy traffic loads. **AFUrail**can be supplied in customised heights starting from 100 mm, enabling the maximisation of ballast depth beneath the sleeper – especially valuable where clearance is limited.

Pre-fabricated. Installed. Ready for load.

Switch & Crossing & Turnout Solutions

Turnouts are among the most cost- and maintenance-intensive components of railway infrastructure. Traditionally, wooden sleepers have been preferred in these areas due to their favourable elastic bending behaviour, which makes them more economical and less maintenance-intensive compared to more rigid alternatives.

AFUrail builds on these very advantages.The material exhibits a linearly elastic response, preventing the kind of plastic deformation often seen in timber – particularly in critical areas such as frog points.This ensures track gauge stability, a perfect rail head alignment, and significantly improves both the service life and maintenance costs of the turnout.

AFUrail sleepers can be installed using the same methods and tools as timber, ensuring high track stability. Field tests have shown that, even in the event of a derailment, gauge integrity is maintained, enabling safe re-operation of the line once cleared and released by authorised personnel.

Naturally, **AFUrail** is fully compatible with:

- Slab track systems (with or without rubber boots)
- Conventional ballasted track
- Rack railway applications

Practical experience in all of these areas confirms flexible and reliable performance.

Stable. Resilient. Efficient.

Special Applications

Thanks to its wood-like workability, **AFUrail** can be used in nearly all areas where timber has traditionally been applied. Especially in the rail sector, **AFUrail** opens up a wide range of applications far beyond conventional use.

Track Crossings: In some countries, timber track crossings have a typical service life of only 6 to 8 years. **AFUrail** can be used both as surface decking and support sleepers, significantly extending service life and reducing maintenance frequency.

Long Timber Replacements: For bridges and turnouts, particularly in the Anglo-American market, large cross-sectional profiles of up to 60 cm in height, 70 cm in width and 11.8 m in length can be manufactured to precise specifications. **AFUrail** offers a durable, dimensionally stable alternative to traditional long timbers.

Service Walkways and Pedestrian Bridges: AFUrail is an ideal solution for trackside walkways, providing railway personnel with a safe crossing. It can be colour-marked to meet railway operator safety standards. Pedestrian bridges that span rail lines also benefit from anti-slip **AFUrail** decking, providing a low-maintenance alternative to wood.

Bridge Structures: On open steel bridge frameworks, where steel or plastic grating is commonly used, **AFUrail** offers a secure, enclosed alternative – preventing falling objects and enhancing safety for both rail traffic and any infrastructure below.

Large-Scale Structures: AFUrail is also well-suited for complex construction elements, such as bridge substructure frames with varying installation heights. It provides strong, long-lasting support even under demanding structural conditions.

We look forward to hearing from you – we provide customised solutions for every challenge.

Adaptable. Versatile. Tailor-made.

Dimensions

To support your planning and application needs, we provide below a broad overview of the available dimensions in which this technology can be manufactured and delivered.

This range is not to be seen as a limitation, but rather as a starting point. Customised solutions can of course be discussed with us at any time. We are committed to meeting your project requirements with precision and flexibility.

Standard Railway Sleepers and Bridge Timbers
Height: 10 cm to 60 cm
Width: 20 cm to 35 cm
Length: 50 cm up to 11.80 m
(e.g. for bi-block solutions)

Bridge Long Timbers
Height: 10 cm to 60 cm
Width: 20 cm to 70 cm
Length: 100 cm up to 11.80 m

Special Profiles
Height: 1 cm to 60 cm
Width: 10 cm to 70 cm
Length: 50 cm up to 11.80 m

Versatile. Precise. Project-ready.

Environment & Recycling

AFUrail is manufactured through an environmentally conscious production process. The company relies predominantly on renewable energy sources, such as wind and solar power – not only for the final manufacturing stage, but also for the production of many key components.This results in a particularly favourable Environmental Product Declaration (EPD) rating.

With an expected service life exceeding 50 years – and the potential for reuse in less demanding applications thereafter – **AFUrail** offers a total lifecycle of up to 120 years. Initial planning is already underway to establish recycling pathways after this extended service period. As with established market practices, the material could be reprocessed and reintegrated into the production cycle to manufacture new products.

Alternatively, similar to timber sleepers, **AFUrail** units may find secondary use in private or non-railway applications.

Recyclable. Sustainable. Responsible.

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