

GLOBALLY LEADING TECHNOLOGY

WONROSTM
technology

Railway Friction Management

Contact friction **noise**

Rail and wheel **wear**

Wheel-rail interface **vibrations**

www.wonros.com

Pioneering technology in railway friction noise management since 1991.

Unprecedented dedication to the research of the nature of the wheel-rail interface resulted in a comprehensive technology system. WONROS™ stands for **Wear Out and Noise Reduction On Source** and is **protected with over 30 industrial patents**.

Within the scope of the WONROS™ technology dedicated solutions in the field of railway friction have been developed since 1991. It is the most developed technology system focusing on rail friction management.

Award-winning technology

WONROS™ is still the only effective and environment friendly technology to address a globally unresolved problem of braking friction noise generated by the railway track brakes (retarders) on hump yards with noise levels exceeding 130 dBA. Among other prestigious awards the technology was granted a **European Business Award for the Environment** by the European Commission in 2004. The International Union of Railways granted it Research and Innovations award in 2012 and 2014 for **“outstanding contribution to the innovation of the global railway system.”**



NOISE

Up to
99,9 %
rail friction noise reduction

The WONROS™ is globally most advanced and innovative technology system targeting railway friction noise, especially the high frequency spectrum, perceived as squealing and screeching. With every 3 dBA reduction the power of the noise drops by 50% and humans perceive the noise to be 50% lower. Independent measurements show WONROS™ technology reduces noise by up to 30 dBA – the perceived noise can be almost completely eliminated.



WEAR

Over
300 %
extension of rail/wheel lifetime

Measurements have shown that average lateral wear of rail gauges (and corresponding wheel flanges) in tight curves has decreased by more than three times. The technology reduces overall lifecycle cost of ownership and is self-financing. Payback periods can be as short as 2 years.

VIBRATIONS

Reduced
vibrations

Vibrations stemming from the wheel-rail interface impact negatively bearings and other parts of the rolling stock. The vibrations are also transferred to the infrastructure and further to the buildings nearby. The technology has a positive impact on the lifecycle of the infrastructure and rolling stock. It significantly reduces vibrations as experienced and reported by the inhabitants living next to the track.

Protected with **over 30 industrial patents.**

About WONROS™ technology

WONROS™ technology introduced more than twenty years ago **a new paradigm in railway “lubrication” industry**. It discontinued the use of potentially dangerous conventional lubricants in railway sector. It introduced friction balancing agents named Composite Hardly-Fluid Compounds (CHFC).

CHFC composite materials contain high proportion of **anti-noise, anti-wear and anti-vibration additives**. They form mechanically highly resistant microfilm that balances adhesion in the wheel-rail interface. The technology significantly reduces gauge wear, gauge corner cracking (GCC), rolling contact fatigue (RCF), top of rail corrugation (sinus line) and vibrations.

With **over 40 % of solid micro particles** of different size, shape and hardness the CHFC composite materials proved to be an **obstacle for the existing rail lubrication technology**. Therefore, alongside with the composite materials also dedicated devices and systems have been developed to assure precisely timed, targeted and stable application.

Enjoy the silence!



grooved rail



vignole rail



retarders

Youtube videos before/after introducing WONROS™ technology.

Braking distances
are not compromised.

The safest technology on the market

CHFC composite materials are the only class of materials that can be **applied simultaneously on top of rail and rail gauge** and to the corresponding wheel parts. According to the applied quantity they can adapt to different pressures, frictions and temperatures in the microenvironment of the wheel-rail interface. Adhesion is balanced in the entire contact area within frames accepted by the tribological science. This finally provides highest levels of railway traffic safety. **Required traction is maintained in demanding weather conditions** – the technology performs well during cold winters and rainy Monsoon periods. Independent measurements show that braking distances stay on approximately the same level and are sometimes even slightly shortened.

Physical properties of CHFC composite material were **tested on a large friction dynamometer** by Deutsche Bahn and the results were assessed as very good. This was later continuously confirmed in practice. The **composite materials do not react with rain**. Their efficiency is not affected in wet conditions and consumption does not increase. They do not interfere with the **required rail conductivity** and are **non-corrosive**.



The technology and management systems have been **attested by various independent certifying bodies**. CHFC composite materials comply with the EU environmental regulation REACH. They are environmentally friendly and composed of biodegradable base. They contain no heavy metals or materials that bioaccumulate. Their environmental compliance was confirmed by certifying laboratories in Belgium and Germany.

The technology of the future:
saving money and **environmental resources**.

Scope of WONROS™ technology

Devices and applications supported with
WONROS™ technology provide solutions
for all parts of the wheel-rail interface,
being mounted at trackside or on-board
with complete set of supporting devices
for installation and maintenance.

01



TRACKSIDE

CL-EI

Rail friction management
device
For Vignole and grooved
rails

BREMEX ANNSYS

Anti-noise and anti-wear
system for hump yard
retaders

02



ON-BOARD

i-ROCK

Spraying system with
compressed air required
(anti-noise, anti-wear
and anti-vibration)

DRYproANNSYS

Contact system w/o
compressed air
(anti-noise, anti-wear
and anti-vibration)

03



SUPPORTING DEVICES

FILLING STATIONS

For trackside and on-board
devices

SERVICING, INSTALLATION & RUNNING-IN DEVICES



Trackside devices

CL-E1 trackside devices are the most sophisticated trackside equipment on the market protected with several patents. They enable large savings due to reduced rail wear when appropriate composite material is applied. Devices only require preventive maintenance twice a year.

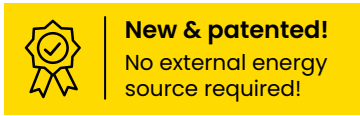
Very long independence periods from refilling.



CL-E1

Modular system adaptable to different situations:

- Vignole and grooved rails with different configurations can be addressed,
- independence periods from refilling are typically 2-6 months,
- wayside or underground containers,
- addressing single or double track,
- different parts of the rail can be addressed independently or simultaneously: rail gauge, TOR, check rail,
- highly efficient patented methods of application - dosing blades or drilled holes,
- Homogeneity of the composite material assured with effective mixing system,
- Complete protection from "overdosing",
- Energy supply: grid, solar, wind, fuel cells,
- remote control.



LIMbo

A mechanical drive for CL-E1 device - no electricity required.

- Designed against vandalism and theft.
- Ideal where other energy sources are unavailable: tunnels, remote railways, locations with insufficient sun or wind exposure, etc.
- The solution exploits kinetic energy of the passing wheels on Vignole rails for stable functioning of the pumping and mixing systems of the trackside device.
- Combined with the underground installation of the container, the solution is well hidden and protected against theft and vandalism.
- Even with 100 % mechanical drive, a remote-control option is enabled.



Marshalling yards with hump

Globally unique system for reduction of high frequency noise emitted by rail track brakes on marshalling yards with hump. This is the loudest noise emitted by the railway sector and it often exceeds 130 dBA. The system significantly reduces wear and maintenance costs of rail brakes, frogs, rails and check rails.

Squealing can be reduced by up to **99,9 %**.



BREMEX ANNSYS

- System is installed before track brakes – independently from brakes.
- Suitable for all types of brakes: pneumatic, hydraulic, single, double.
- Material is applied between steel contact parts on wheel/rail brake and wheel/guide rail.
- Standard system is suitable for single or double brakes.
- Custom solutions for longer brakes or special types of brakes.
- Double check and feedback control.

Advantages:

- Efficient reduction of high frequency noise (HFN) on the entire marshalling yard (by up to 99,9 %).
- Very efficient wear reduction of braking shoes (up to 8 times).
- Very efficient wear reduction of guide rails and switches on the entire marshalling yard.
- Reduced lifecycle cost of braking mechanisms because of reduced vibration and “softer” braking.

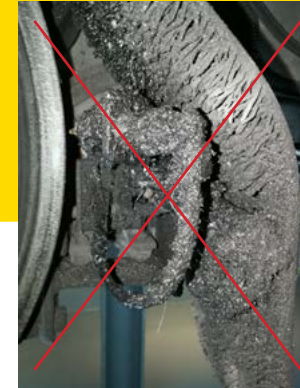




On-board devices

On-board devices are the only systems to apply CHFC composite materials both on wheel tread and wheel flange. They are suitable for OEM or retrofitting. A sophisticated and patent protected technology to address rail friction in passenger railway systems like metros or trains. Contact system DRYproANNSYS is targeted primarily at tramways and enables effective application of liquid composite materials on wheels without compressed air.

The cleanest technology
on the market.



i-ROCK

Spraying system for CHFC materials with over 40 % solid particles.

- The only spray system (patented) for applying CHFC materials on all or selected parts of the wheel-rail interface.
- CHFC materials applied by i-ROCK do not drop or leak – low to none vehicle bottom soiling.
- Highly precise application to chosen parts of the wheel with the patented system of paired nozzles.
- Lower consumption of compressed air.
- High energy efficiency.



New & patented!
No compressed
air required!

DRYproANNSYS

Contact application system for CHFC materials – no compressed air.

- Application on wheel tread, wheel flange & wheel flank.
- System prevents soiling of the vehicle bottom or ballast when CHFC composite materials are used.
- Highest possible precision of application to chosen parts of the wheel with the system of dozing capillaries.
- CHFC materials applied with DRYproANNSYS do not drop or leak – lowest technologically possible vehicle bottom soiling.

Composite Hardly-Fluid Compounds CHFC

Highly effective CHFC composite materials are integral part of the WONROS™ technology. Special types have been developed for on-board and trackside applications.

CHFC are a NLGI grade 2 composite materials and the only ones on the market that can simultaneously **safely be applied on all parts of the wheel-rail interface** as they maintain the adhesion within the limits applicable in regular traffic. The consumption rates are typically several times lower compared to mineral-oil-based flange lubricants and top of rail friction modifiers. As a result little to no soiling can be expected. Over **40 % of solid microparticles makes them the most effective mediums** against noise, wear & vibration in all weather conditions. Rain does not degrade their performance. Read more on pages 6-7.

Expect unexpectedly
low consumption!

Complete technological support

WONROS™ includes defined procedures along with devices and contraptions for installation, servicing and maintenance of the technology. Complete knowledge is transferred to reselling partners and maintenance companies along with required devices.

- Automatic filling stations with different container sizes: 25, 50 or 80 kg of material.
- Servicing devices: lifting device for underground reservoirs.
- Servicing transporting trailer MAX, servicing, transporting trailer LIGHT.
- Drilling devices for Vignole rails along with the patented technology.

Proven technology
- little maintenance
required.

Global problem solving

Public expectations for quieter and CO₂ neutral railways are more and more vocal. Legislations are adapting at a different pace and introducing new standards. This creates a growing market opportunity for technologies that meet new demands.

For successful technology implementation partners are at disposal (and still searched) worldwide. They provide solid support from installation to after-sales activities. Modularity of the technology enables assembly production by franchise partners to efficiently serve local markets and brands.

Railways are
**underserved with
safe & efficient
friction management
technology.**

Reducing CO₂ footprint

Iron and steel industries account for 11 % of total CO₂ emissions and railway sector spends billions by laying more than 10 million tons of rails each year: imagine a steel cube with a side of 108 m which is a height of a 25-storey skyscraper. Wear of rails also contributes to heavy metal emissions. Wider introduction of proven technologies against rail friction is an important step in fighting climate change that is embodied in the green deal that aims to make European Union climate neutral by 2050.

Environmental awareness has always been at the core of the WONROS™ technology. Railway friction noise has been its focus long before it came under the stage lights of wider public, railway sector and legislators. The persistence in trying to solve this longstanding problem resulted in a technology system that addresses all negative impacts of railway friction. As it turns out decades later, one of the most prominent features of the WONROS™ technology is its intrinsic ability to fight climate change and contribute to overall environmentally friendly railways.

World's best technology
for friction noise
reduction!

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and tribotechnology
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