

FLEXIBILITY, ACCESSIBILITY, VALUE

Kelsan® Solutions ARE RICH IN FEATURES AND TECHNOLOGY THAT DELIVER POWERFUL FRICTION CONTROL SOLUTIONS

WHY KELSAN® ?

- Kelsan®, with over 100 satisfied customers, has a proven track record of providing effective and reliable solutions.
- Our products are produced under tight quality control governed by our ISO 9001:2000 certification.
- We have in-house R&D and field technicians including several PhD's and certified engineers that are constantly improving existing products and creating innovative new products.
- Kelsan's dedicated design engineering and production team use FEA analysis software to produce locomotive and customer specific delivery systems.
- Kelsan has a combined experience of over 110 years in solid stick systems.

COMPLETE FRICTION CONTROL SOLUTIONS

Kelsan Technologies is not simply a product supplier. We are dedicated to providing our customers with comprehensive cost effective friction control solutions.....sustained solutions.

Our engineers partner with customers, freight locomotive and original equipment manufacturers to identify system challenges, measure baseline data, establish mutually acceptable performance criteria, and deliver pertinent solution. Kelsan's professional technical staff provides engineering services for product installation, systems maintenance, and long-term customer care. Following installation, Kelsan offers training seminars for vehicle and track personnel, and we conduct periodic after-sales system checks to ensure that system benefits are sustained.

EXCLUSIVE TECHNOLOGY PROVIDERS

Proprietary technology is the foundation of Kelsan's success. Our research and development team is constantly adding and improving its product line in order to continue bringing leading-edge friction control solutions to our freight customers.



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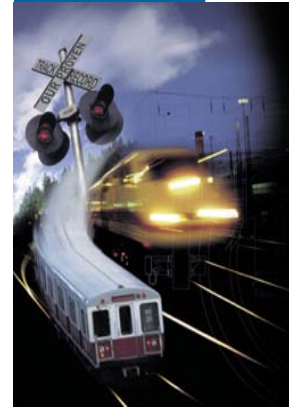
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KELSAN TECHNOLOGIES CORP.

INNOVATIVE ThinFilm FRICTION CONTROL



Kelsan® Complete Transit Solution

OnBoard Transit Gauge Face Lubricant and TOR Friction Control System

Kelsan® LCF Solid Stick Gauge Face Lubricant
Kelsan® HPF Solid Stick Top-of-Rail Friction Modifier

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The
friction
FORCE
Assessment • Implementation • Management



Kelsan delivers robust, integrated friction control solutions

that offer transit rail authorities unprecedented power and flexibility in mastering operating costs. Kelsan's flagship products, Kelsan® LCF and Kelsan® HPF, have been expressly designed and optimized for transit rail authorities committed to achieving excellence in their operating practices. The effectiveness of these products is well-documented, supported by third-party references, and recognized globally throughout the passenger rail industry.



Kelsan friction solutions incorporate exclusive, proprietary technologies that do not simply provide superior lubrication: they also impart "friction control" capabilities. Friction management provide different — but equally valuable — benefits. Friction control is the ability to control friction at the wheel/rail interface, within a target range. Kelsan Technologies is the only company in the world which offers proven friction control solutions.

Kelsan Transit Solutions deliver a powerful and feature-rich solution that has established new standards for energy conservation, noise reduction, and extended wheel and rail life.

Kelsan® LCF (Low Coefficient of Friction)

Kelsan® LCF is a 100% dry, on-board, solid-stick lubricant that provides superior lubricity compared to traditional lubricants. Kelsan® LCF has achieved unsurpassed, documented wheel wear rate reductions. It will not migrate to the rail head, or contaminate ballast, track structure, or vehicle equipment.

TRIPLE WHEEL LIFE

The unique properties of Kelsan® LCF and the reliability advantages of Kelsan's onboard application system combine to deliver a highly effective wheel wear management solution. Although wheel wear rate reductions will vary from system to system, on average, transit customers can expect to dramatically extend flange life.

- Extend wheel life by reducing flange wear
- Minimize gauge face/rail wear
- Reduce energy consumption
- Decrease the risk of low-speed derailments
- Does not migrate to rail head
- No effect on traction or braking
- Environmentally friendly & non-flammable

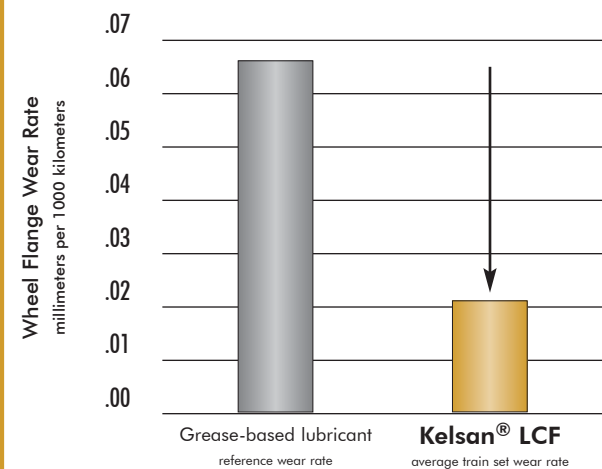


How does Kelsan® LCF work?

Kelsan® LCF is applied directly to the wheel flange by vehicle-mounted, spring-loaded applicators that deposit a five micron-thick film at the interface of the wheel flange and gauge face.

Kelsan® LCF is applied with precision, and will not migrate to the rail head. This, combined with its superior lubricity, make Kelsan® LCF more effective in reducing wheel wear than any other lubricant on the market.

Flange Wear Rate Reduction*



* typical results from a major transit system

Kelsan® HPF (High Positive Friction)

Kelsan® HPF is a 100% dry, on-board, solid-stick friction modifier for application at the interface between the top of the rail and the wheel tread. Kelsan® HPF is not a lubricant — it is a friction modifier that maintains friction at the wheel/rail interface of between $.17\mu$ in pure rolling conditions and $.35\mu$ in rolling/sliding conditions. Through its proprietary formulation, Kelsan® HPF controls shear (metal-to-metal interaction at the micro-scale level) by imparting positive friction characteristics between the wheel tread and the top of the rail. This action provides benefits such as reducing noise by as much as 20dB, a drop in lateral forces of 30% – 50%, and a significant decrease in energy consumption.

REDUCE NOISE

Reduce noise without impacting critical braking performance. Kelsan® HPF reduces the onset of short-pitch corrugations caused by stick-slip. As a result, high-squeal noise — which is generated by the interaction of these surface indentations — is significantly reduced. Kelsan® HPF is a friction modification agent that can be utilized alone or in dual application with Kelsan® LCF for a complete friction management solution.

- Drop noise levels by up to 20 decibels
- Reduce tread wear & wheel replacement costs
- Cut wheel truing costs
- Minimize rail corrugations
- Does not migrate to gauge face
- No effect on signal transfer or braking
- Environmentally friendly & non-flammable

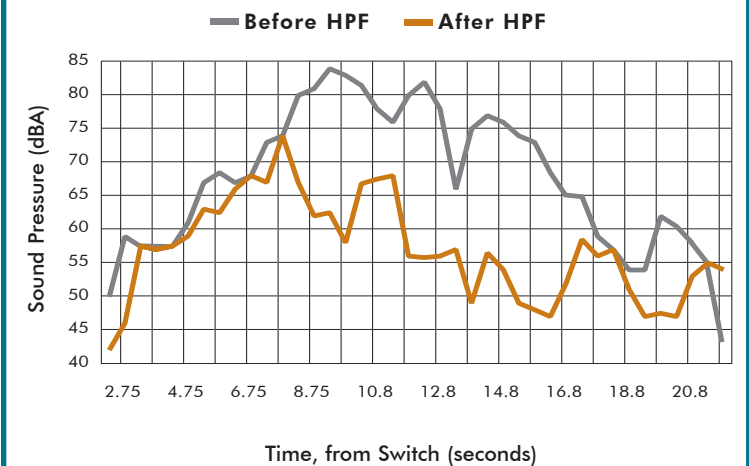
EXTEND RAIL LIFE

Minimizing the effects of lateral forces significantly reduces rail wear. By maintaining a controlled level (coefficient) of friction between the rail head and the wheel tread, Kelsan® HPF reduces the harmful effects of lateral forces.

- Reduce costly rail replacement
- Minimize rail wear and gauge widening
- Decrease lateral forces by up to 30% - 50%
- Safer vehicle operation

Noise Level Reduction*

Time Slice Graph



* typical results from a major transit system

CUT ENERGY CONSUMPTION

Independent testing confirms that energy savings of as much as 10% can be achieved by using Kelsan® HPF. By controlling friction at the wheel/rail interface, Kelsan® HPF reduces stick-slip forces and curving resistance. This action contributes to a significant reduction in energy consumption.

- Cut energy consumption
- Reduce energy costs

How does Kelsan® HPF work?

Kelsan® HPF is not a lubricant. It is a friction modifier, applied directly to the wheel tread, that deposits a five micron-thick film between the wheel tread and the top of the rail.

This film has positive friction characteristics that reduce the onset of short-pitch corrugations caused by stick-slip. It also reduces lateral forces by as much as 50%. The result: significant reductions in both noise and energy consumption.

