

Wayside Rail Lubrication



Fully Automated Lubrication Systems for Gauge Face and Top-of-Rail

- Wear and noise reduction on rails and trains
- Exact metering of lubricant for every single lubrication point
- High-pressure system for all-year usage and for lubricants up to NLGI 2

Why Wayside Lubrication?



Lincoln wayside (stationary) rail lubrication lowers noise emission and considerably reduces wear on rails, switches and wheels.

Why Wayside Lubrication?

A drastic increase in wear is prevalent on rails, wheels and switches on highly strained areas of track networks.

Typical wear patterns in curves are slip-deformation on the inner rail (low rail) and lateral wear on the outer rail (high-rail). Furthermore the noise emission is greatest through curves. Stationary, or Wayside, lubrication systems from Lincoln for rail flanks and rail heads enormously reduce wear and noise emission on these highly strained areas.

Wayside high-pressure systems enable the usage of mediums with a viscosity class of NLGI 2. In comparison to adhesive spray lubricants, such mediums are characterized by an exceptional adhesion to the rail and wheel as well as better lubrication properties.

The maintenance costs for rails, wheels and switches, as well as measures to reduce noise emission, are greatly reduced, and the lifespan of the rail network is increased.

Progressive Lubrication Systems with Lincoln's proven SSV Metering Devices

Lincoln lubrication systems for rail flanks and rail heads supply lubricant or friction modifiers in controlled, even and exact metered quantities independent of temperature and lubricant viscosity.

Lincoln SSV metering devices and FlowMaster pumps have proven themselves over many years, not only in rail lubrication, but also in equivalently harsh applications such as mining and heavy industry.





Purposes of Emission and Wear Reduction



Purposes of Emission Reduction

Quality

- Improved quality of living for residents
- Increased acceptance of the rail traffic

Cost reduction

- Reduction of noise protection measures
- Cost elimination for special track routing and track bed constructions

Purposes of Wear Reduction

Network Availability

 Increase network availability resulting from less maintenance work

Quality

- Ensured quality of the rail infrastructure
- More reliable operation

Cost reduction

- Optimization of the economic lifespan of systems and trains
- Minimization of rail re-profiling
- Long-term reduction of maintenance costs on wheels and tracks



Gauge Face Lubrication and Top-of-Rail Conditioning

Two Strategies for Track Curves



Gauge Face (Rail Flank) Lubrication Reduces Wheel Flange Friction

In curved sections the high rail (outside curve) wheel runs on the gauge face. This results in a semicontinuous friction that significantly causes wear to the wheel flange and gauge face. The strong contact friction forces between wheel and rail contact surfaces cause noise emission in the track curve.



Depending on the application, Lincoln offers lubricant wipers for gauge face or top-of-rail lubrication. In highly strained areas, both applications can be used together.



Silent Tracks

Especially in city center areas where tight track curves are prevalent, lubrication systems offer the solution to reduce the notorious curve squealing.

The Lincoln gauge face lubrication applies the lubricant high up on the rail flank in order to minimize the friction between gauge face and wheel flange. As a result, the wear and the noise emission are strongly reduced.

With a suitable lubricant that adheres well to the wheel flange, several track curves in succession can be supplied from one wayside system.

Top-of-Rail Conditioning Against the Slip-Stick Effect

The path of the inner curve wheel is shorter and the wheel runs toward the rail middle causing tension. When the tension is greater than the frictional forces, the inside wheel jerks and slips. This slip-stick effect causes the inner wheel to shudder – resulting in screeching and wear on the running surface. This effect is especially prominent on very tight track curves.

A head conditioning (friction modifier) system works against this at the point of origin. By applying a minimum amount of friction modifier on the top-of-rail, both screeching and slip deformation can be subdued.

Normally specialty mediums are used that do not significantly affect the necessary friction coefficient of the running surface.



Applicators

Operational Principal of Wayside Lubrication



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Lincoln wayside (stationary) lubrication systems apply lubricant with an applicator (wiper bar) that is flanged to the rail profile. The lubricant is accurately applied to the contact surface such as the gauge face or top-of-rail.



Divider Divider Pump station Axle Counter

Divider

monitoring

Typical assembly of a lubrication system for Gauge Face Lubrication

Grooved tram rails can be equipped with lubricant channels by a special drill unit.

Sensors detect and count the axels of the approaching train and initiate a lubrication impulse.

The duration of the impulse which determines the lubricant supply, is adjustable and can be set to the applicable conditions.

A high-pressure pump supplies the wiper bars with an exact metered amount of lubricant. The monitoring of the lubrication impulse and the system function is standard on Lincoln systems. The lubricant is picked up by the train's wheel circumference and evenly distributed on the rail contact area. Depending on the lubricant and application (gauge face or top-of-rail lubrication), the distributed lubricant is evident for kilometers beyond the stationary lubrication station.

Applicators and SSV Metering Devices



As the leading manufacturer of centralized lubrication systems, Lincoln has a wide range of pumps and system components.

This enables us to offer lubrication systems that are individually tailored to your requirements.

Applicators

The wiper bars (applicators) are specially designed for either gauge face lubrication or for top-of-rail conditioning (friction modifiers).

The wiper bars enable a precise application of lubricant to the gauge face or top-of-rail. They are flange mounted with brackets to the rails – drilling of the rails is therefore not required.

The special feature of the patented wiper bars lies in the individual lubrication channels that, in conjunction with the Lincoln progressive metering device, ensure an identical metered quantity of lubricant to each outlet.

SSV Metering Devices

The SSV progressive metering devices are piston-type units in a solid-block form that reliably meter the lubricant in individual quantities. A unique characteristic of the progressive metering device is that an outlet must fully dispense the lubricant before the next one can begin. As a result, the lubrication process can easily be visually or electrically monitored. The Lincoln progressive metering devices do not have trouble-prone rubber seals or o-rings. As a consequence they are ideal for applications with high back pressures and they can be used in a wide range of temperatures.

Specifications

| Metered Volume per Outlet: | | |
|-----------------------------|---------------------|--|
| | 0,2 cm ³ | |
| Max. Pressure: | 350 bar | |
| Max. Differential Pressure: | 100 bar | |
| Max. Start Pressure: | 20 bar | |
| Operating temp.: -40° C t | to +70° C | |



FlowMaster Drum Pump



Benefits:

- Solid-block form eliminates leaks
- Higher operating pressure
- Precise lubricant metering
- Simple operation monitoring

FlowMaster Drum Pump

FlowMaster pumps are robust and were designed for the demanding conditions of construction and mining applications. The high-performance FlowMaster piston pumps with a 24 VDC rotary drive, are very reliable and can pump lubricant at very low temperatures. The required amount of lubricant is easy to adjust. The compact Flow-Master pump is used when the rail lubrication system is to be supplied from standard 18-200 kg drums.

Specifications

| Operating Voltage: | 24 VDC | |
|----------------------|--------------------------------|--|
| Output: | ~ 1.15 cm ³ /cycle | |
| Output flow minmax.: | | |
| | 10 to 100 cm ³ /min | |
| Supply Pressure: | max. 345 bar | |
| Operating temp. : | -40° C to +65° C | |

Benefits:

- Suitable for standard exchangeable 18–200 kg drums
- Suitable for high-viscous mediums
- Designed for high pressure
- Reliable, brushless motor
- Adjustable RPM (output)
- Reliable supply even at low temperatures



Precise piston fit: exact metering and consistent output

P653 Reservoir Pump



P653 Reservoir Pump

The reservoir pump P653 is designed for compact rail lubrication systems that are intended for a minimal consumption. This pump is also used for rail head conditioning systems, especially in municipalities with public rail transport.

The P653 is for high-viscous mediums, and it can pump at a pressure of up to 300 bar.

Specifications

| Operating Voltage: | |
|--------------------|------------------------------|
| 24 V | DC/100-240 VAC |
| Output: | max. 24 cm ³ /min |
| Pumping Pressure: | max. 300 bar |
| Operating temp.: | -40° C to +70° C |



Benefits:

- Compact design
- Suitable for high-viscous mediums
- Designed for high pressures
- Integrated low-level
- Flexible selection of reservoir sizes up to 15 liter
- Reliable pumping even at low temperatures

Lincoln pumps and accessories supply high-viscous lubricants up to NLGI 2 and higher.

A lubricant with a higher viscosity adheres better to the rails and doesn't seep under high temperatures onto the track bed.

High pressure systems reliably supply lubricant even in cold temperatures.



Accessories and Optional Equipment



Controllers

Whether the compact Lincoln LMC2 controller for smaller systems, or PLC controllers for complex systems, our controllers are matched to each application and are programmed according to your requirements.

The parameters of the lube system can be matched with guided menus.



Solar Systems

The lubrication systems can be independently solar powered. The required rating of the solar module will be matched with the local sunshine conditions.

Wheel Sensors

Axel counters to determine the number of axels, enable an optimum lubrication setting that correlates to the track strain. A single direction signal pick-up is also possible.

Rain Sensors

Rain can reduce noise emission and curve squealing. Rain sensors adjust the lubrication cycles accordingly and as a result, reduce the lubricant consumption.

Low Level

Optional ultra sonic low level detection with pre-warning for all container sizes ensures that container changes are planned in time.

Remote Monitoring

System messages can be sent via GSM/GPRS to cell, fax or email. User-friendly online monitoring of the Lincoln systems is also possible. The Lincoln controllers can also be integrated into existing customer remote monitoring systems.



Gauge Face Case Study

Wear Analysis with/without Gauge Face Lubrication

Gauge Face (Rail Flank) Lubrication Case Study

Rail lubrication systems are used to reduce wear and curve noise on gauge face and top-of-rail. The following case study from an operator shows that even the wear on switches is greatly reduced.

Various sections of the train station track network were measured and analyzed.

The measurements before and after the installation of the gauge face lubrication system were each conducted over a 6 month period.

Wear Reduction on Switches

The result shows a clear reduction in wear on all assessed elements of the switches.

With only one gauge face lubricator from Lincoln the lifespan of several switches could be greatly increased.



| Me | easurement point | without Rail Lubrication | with Rail Lubricatior |
|----|------------------|--------------------------------|-----------------------------|
| 0 | Frog (common | | |
| | crossing) | 0,0 | 0,0 |
| 1 | Point blades | 2,5 | 0,0 |
| 2 | Point blades | 3,5 | 1,0 |
| 3 | Point blades | 3,0 | 1,0 |
| 4 | Gauge Face | 4,0 | 0,5 |
| 5 | Gauge Face | 4,5 | 0,0 |
| 6 | Gauge Face | 3,5 | 1,0 |
| 7 | Guard rail | 4,5 | 0,5 |
| | | | |





| Me | easurement point | without Rail Lubrication | with Rail Lubrication |
|----|------------------|--------------------------------|-----------------------------|
| 0 | Frog (common | | |
| | crossing) | 0,0 | 1,0 |
| 1 | Point blades | 2,5 | 1,0 |
| 2 | Point blades | 1,0 | 0,5 |
| 3 | Point blades | 3,5 | 0,5 |
| 4 | Gauge Face | 4,0 | 0,0 |
| 5 | Gauge Face | 2,0 | 0,0 |
| 6 | Gauge Face | 3,5 | 0,0 |
| 7 | Guard rail | 3,0 | 0,0 |
| | | | |

without Rail Lubrication
with Rail Lubrication

Wear Reduction in Track Curves

After 6 months of operating the lubrication system there was as good as no measurable flank wear on the track curve.

In this case, lubricant on the rail flank was evident for a distance of 3500 m after the lubricator.



| Measure- ment point | without Rail Lubrication | with Rail Lubrication |
|------------------------|--------------------------------|-----------------------------|
| 1 | 1,1 | 0,0 |
| 2 | 1,1 | 0,0 |
| 3 | 0,0 | 0,0 |
| 4 | 2,1 | 0,0 |
| 5 | 2,1 | 0,0 |
| 6 | 0,5 | 0,0 |

*Analysis were conducted on switches and track curves that were subjected to the Lincoln gauge face lubrication within the train station track network of Sverdlovsk-Toarni, Russia.



Wayside Rail Lubrication

Benefits and Specifications



Your Benefit – with an Individually Tailored Lincoln Rail Lubrication System

- Systems to reduce wear and noise emission
- Exact and variable metering on the gauge face and top-of-rail
- High-pressure systems for highviscous lubricants and top-of-rail friction modifiers
- Lubricant is pumped from standard drums – no decantering, no specialized solution
- Complete system monitoring feature: function, filling level and output
- Individual and flexible system layout
- Installation and service from one source

Specifications

Max. Operating Voltage: 345 bar Temperature Range: -40° C to +60° C Supply Voltage: 24 VDC 110-240 VAC 24 V Solar Module Container: Standard size drums 18-200 kg Reservoir pumps up to 15 Liter Monitoring: Lubricant metering device function Low-level Remote monitoring Suitable mediums: Viscosities up to NLGI 2 and higher **Bio-degradable lubricants** Lubricants for gauge faces Friction modifiers for rail heads* (topof-rail)

*Top-of-Rail friction modifiers often contain a large portion of solid particles which can lead to earlier component wear. Lincoln has checked its system components, and where required, has made technical adjustments to suit these special lubricants

Environmental Information

Lincoln fully automated wayside lubrication systems are used on gauge faces and rail heads to minimize wear and noise emission on tracks and trains.

SSV metering devices enable an exact and minimum metering, thus reducing lubricant consumption. The energy consumption of the locomotive is also reduced. It is possible to monitor and limit the output per lubrication cycle in order to avoid an uncontrolled lubricant application.

The usage of firm lubricants avoids environmental strain from air turbulence as in the case of spray lubricants. The noise emission from trains is reduced. An important factor especially in city areas.



Since 1910, Lincoln Lubrication has Achieved Success Through IQS – Innovation, Quality and Service





Hundreds of Lincoln system houses worldwide are at your service

Whatever service is required – selecting a lubricating system, customized system installation or the supply of top-quality products – you will always be best advised by the staff of the Lincoln offices, representatives and contract dealers. Lincoln main location
 Lincoln offices
 Representatives, contract dealers and system houses not indicated

System dealers

Our systems dealers have the most extensive specialised knowledge in our industry. They plan your installations to suit your specifications with exactly the combination of Lincoln components that you need. They then build the installations at your operation with experienced technicians or work closely with your personnel to ensure that everything goes smoothly.

All dealers have the complete range of pumps, distributers, monitoring devices and accessories in stock and meet our exacting demands with their specialised knowledge about products, installations and service. Whenever and wherever you need our experts, from St. Louis to Singapore, Walldorf and worldwide, Lincoln's first-class systems dealers are at your service.

Find out where the nearest Lincoln distribution and service office to you is located:

America:

St. Louis, Missouri Phone +1 314.679.4200 Fax +1 800.424.5359 www.lincolnindustrial.com

Europe/Africa/India/Middle East:

Walldorf, Germany Phone +49.6227.33.0 Fax +49.6227.33.259 www.lincolnindustrial.de

Asia/Pacific:

Singapore Phone +65.65880188 Fax +65.65883438 sales@lincolnindustrial.com.sg



Lincoln GmbH Heinrich-Hertz-Str. 2–8 69190 Walldorf · Germany Tel. +49.6227.33.0 Fax +49.6227.33.259 lincoln@lincolnindustrial.de www.lincolnindustrial.de © Copyright 2010 Printed in Germany Form W-183-En-0910 DIN EN ISO 9001 durch DQS Reg.-Nr. 799