



DiesoLiFT™

from Unipart Rail

A multi-functional, innovative and high-performance fuel additive



Reduces diesel consumption by up to 4%

Improves engine performance and reliability

Reduction in environmentally harmful emissions



Improving Diesel Performance and Efficiency

The issues associated with the rising cost of fuel, the need to reduce Carbon emissions and improve vehicle reliability require a change in the use and handling of fuel by the rail industry.

In recent years the increase in fuel costs have placed a large amount of pressure on train and rail freight operating companies. This has created a demand for innovative solutions to reduce the volume of fuel used.

Additional concerns are:

- Environment pressure to reduce CO₂ and carbon emissions
- The introduction of ultra low sulphur diesel has increased the risk of water build-up within fuel systems
- The introduction of ultra low sulphur and bio-diesel blends has decreased the stability of diesel fuels

- Increased pressure to extend the service intervals of engine components in order to reduce operation costs.
- Increase in contaminants in unstable fuel

The Unipart Rail Diesel Performance Solution is a complete single source of expertise, advice, product and service solutions to improve fuel system efficiency, increase reliability and reduce the train operators' environmental impact.

The comprehensive range of "tanker to train" products and services include:

- Fuel Testing
- Tank Cleaning and conditioning
- Additive Dosing equipment
- Fuel Additive and equipment supply
- Monitoring, servicing and maintenance

Diesolift - Part of the Unipart Rail Diesel Performance Solution

DiesoLiFT™ is a multi-functional, innovative, high performance fuel additive PROVEN to reduce fuel costs.

The additive is easy to administer, will greatly improve fuel economy while at the same time improving engine reliability and durability.



DiesoLiFT™ has been tested and used commercially in road, rail, marine and stationary power generation applications since 2002.



Improve Engine Economy and Performance

- Up to 4% increase in overall fuel efficiency
- Enhances combustion
- Significantly reduces emissions.

Improves Engine Reliability

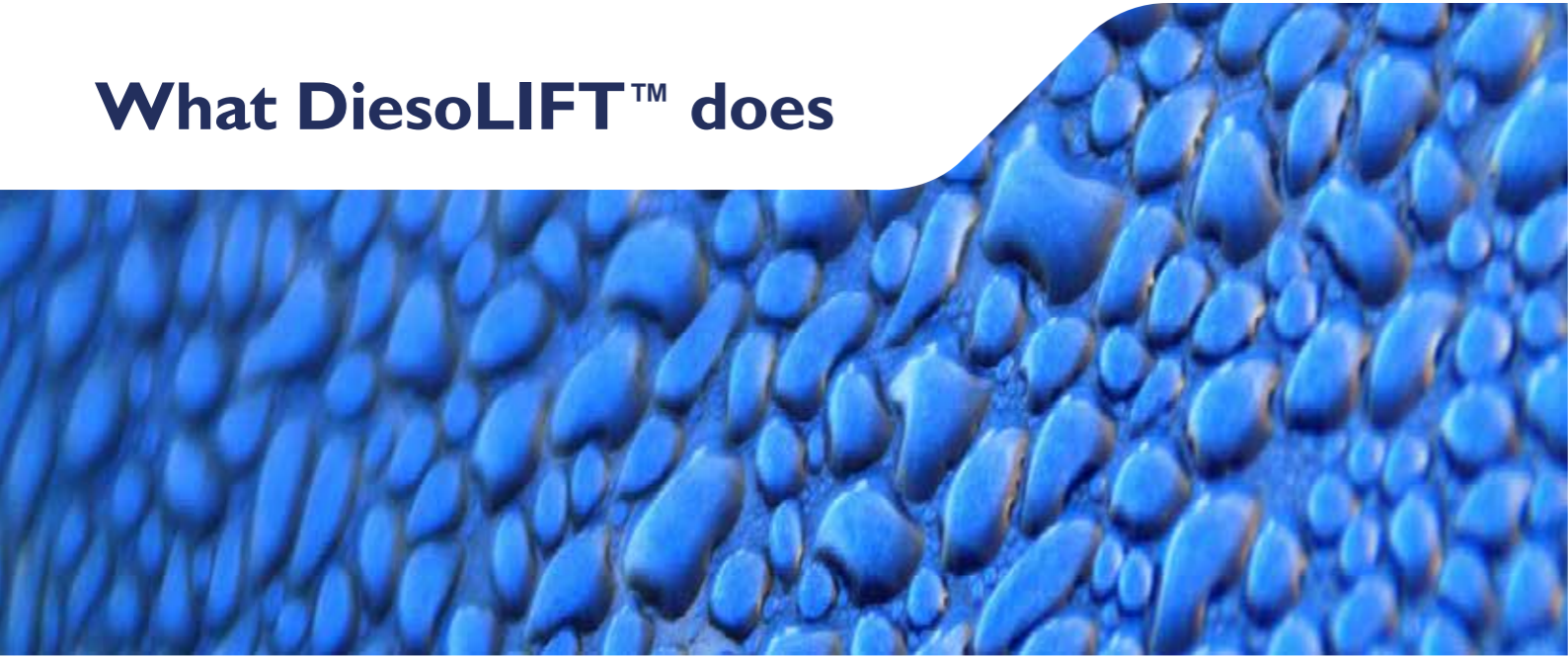
- Improved lubricity
- Improves and maintains cleanliness of the engine and the components
- Inhibits corrosion
- Reduces engine maintenance.

Easy to Administer

- Simply "splash" mix to use at a ratio of 1:500
- Improves oxidation and storage stability of fuels
- Significant reduction of foaming of the fuel
- In line mixing can also be automated with the use of simple electronic control equipment
- Can also be administered on the vehicle if central fuelling points are unavailable.



What DiesoLIFT™ does



Reduction of fuel surface tension (surfactant effect)

- Finer atomization of the fuel in the injectors (increased number of fuel droplets of smaller size)
- Increased exchange surface of fuel droplets
- More complete and efficient combustion
- Higher calorific values
- Substantial fuel consumption reduction
- More carbon monoxide, hydrocarbons and particulates burned
- Reduction of harmful atmospheric emissions
- Subsequent reduction of greenhouse gases (CO₂ and NO_x)
- Protects against foaming.



Technology coats the internal surface of the fuel system and forms a repairable monolayer

- Optimisation of the fuel flow
- Acts as a friction modifier, prevents wear and improves fuel lubricity
- Protection against corrosion and oxidation
- Reduces maintenance costs.

Formation of micelles

- Around the residual molecules of water and alcohol (co-solvent effect) - improves stability
- Around the dirt and debris particles - clean-up action of fuel system by removing dirt and debris
- Protects against microbial contamination.

The technical know how

The unique formulation of DiesoLIFT™ enables the introduction of beneficial surfactant (surface active agents) molecules to the fuel without altering standard fuel specifications. With the introduction of surfactants to fuel, multiple characteristics of the fuel are positively enhanced.



Surfactants are a class of chemical compounds which share many properties of soaps and detergents. These molecules have a dual-affinity characteristic which means opposite sides of a surfactant molecule have an affinity for a different preferred chemical environment (i.e. water, oil, solid).

Once introduced to the fuel, surfactant molecules will disperse homogeneously within the fuel. Some of the surfactant molecules will align along the solid surfaces of the fuel system, effectively creating a protective 'mono-layer' which contributes to increased lubricity and less wear and tear on parts.

The molecules that remain in the body of the fuel help to effectively lower the overall surface tension of the fuel which allows for greater atomisation in the combustion chamber and creates a fuller conversion of fuel to energy which of course, is the reason for the significant fuel economy improvements achieved by DiesoLIFT™.

In addition, the dual-affinity characteristics of surfactants will help to phase out small amounts of water in the fuel system and lift out any deposits, helping to keep the system at peak cleanliness and reducing the risk of bacterial growth in the fuel tanks.



Fuel Economy & Emissions



Finer atomisation (increased number of fuel droplets and smaller in size) of the fuel provides a more complete and efficient combustion of the fuel also burning more carbon monoxide, hydrocarbons and particulates. Therefore, DiesoLiFT™ contributes to generating more energy per mass of fuel consumed. The more complete burn is what accounts for the increase in fuel economy.

Greenhouse gases are also significantly reduced, as a consequence of reduced fuel consumption and less fuel burned per energy produced.

- Proven economy of up to 4%
- Independent engine tests carried out at the world's most renowned technical centres (MI Technology - Motive Power - SWRI)
- Tests & Trials carried out on MTU 6R183, Perkins 2006 TW-H, General Motors Loco SD38, SD40, GB38 and Cummins NTA855R3. All supported by the associated OEM.



Engine Reliability and Performance

Lubricity

DiesoLiFT™ is attracted to metal surfaces forming a thin surface film. The film acts as a boundary lubricant when two metal surfaces come into contact. It has the effect of coating the fuel system and lowering the friction, significantly reducing component wear.

Testing of un-additised diesel fuel shows that HFRR lubricity is dramatically improved below EN590 and ASTM D943 maximum limits when treated with DiesoLiFT™.

Fuel Specification

No effect on fuel composition, make-up or standard specification. Fuel characteristics remain within standard specifications after treatment with DiesoLiFT™ therefore, not affecting engine warranty.

ESSO has stated that not only does the additive not alter the standard specification of their fuel but actually increases the stability of their Diesel Fuels.

Integrity of engine parts preserved

In addition to the increase in lubricity the additive also forms a protective monolayer on all internal parts with which it comes into contact. This provides life long protection against wear, tear and rust.

This extends engine component life and maintenance, reducing related parts, labour and downtime costs. No engine damage or mechanical failure has ever been linked to the use of DiesoLiFT™.

Increased Performance

- Increased power – up to 3.5%
- Boost pressure reduction – up to 4.1%
- Torque improvement – up to 2%
- Particulate reduction – up to 14.5%
- Smoke reduction – up to 24%

Water reduction

DiesoLiFT™ has the ability to encapsulate and phase out the residual water normally present in fuel systems and other contaminants within the fuel via a process called encapsulation. This allows the contaminants to be burned off with the fuel through uniformed combustion.

This also inhibits harmful microbial growth and contamination, providing lifelong prevention of rust and corrosion in tanks and internal parts, which contributes to longer service life for the engine components.

Cleaner Fuel Systems

DiesoLiFT™ has an inherent detergency characteristic, freeing up and preventing dirt and contaminants keeping the engine running at peak cleanliness and maximum efficiency.



Easy to Administer



DiesoLiFT is easy to administer, as follows:

- The product can be simply 'splash mixed' manually or in-line using electronic pumping equipment
- DiesoLiFT™ is supplied in IBC 1000 litre containers and can be included as part of any standard Unipart Rail delivery schedule. No special storage precautions are required as with diesel fuels themselves
- DiesoLiFT™ is available ex-stock and can be used immediately
- Once the system has full purged through with the product (conditioning), which normally takes 3-4 weeks, savings will begin to be made
- DiesoLiFT™ is added at a ratio of 1:500. No flushing of the fuel system is required to begin using the product
- No adverse effects will be seen if the use of DiesoLiFT™ was either over diluted or stopped, only a return to the previous engine performance levels.
- DiesoLiFT™ can also be administered 'On-Vehicle' where no central refuelling process is undertaken
- Unipart Rail will advise and assist on the most appropriate method of administering DiesoLiFT™ for your type of application.

Foaming

Diesel fuels tend to generate foam as they are pumped into vehicle tanks. Foaming can interfere with filling the tank completely, slowing the process, or risking overflow resulting in a spill. Treating diesel fuels with DiesoLiFT™ significantly reduces the volumes of foam generated during filling and also drastically reduces the disappearance time of the foam.

Biodegradability

Independent testing performed on DiesoLiFT™ according to standard OECD 301B protocol for biodegradability determination, confirmed that DiesoLiFT™ has biodegradability ratings well above the 60% minimum rating required for claiming 'ultimate' biodegradability.

Stability

DiesoLiFT™ helps stabilise diesel fuels in storage and prevent deposits, gums and residue formation. DiesoLiFT™ protects against microbial contamination and is also a strong metallic corrosion inhibitor.



Product Performance Results

Many product trials have proven that the use of DiesoLiFT™ improved engine efficiency, reduces fuel consumption and reduces harmful emissions.

London Midland Trains In service field trial 170/5 Fleet

- 3% fuel economy improvement.

Motive Power US EMD 16-645E3 engine

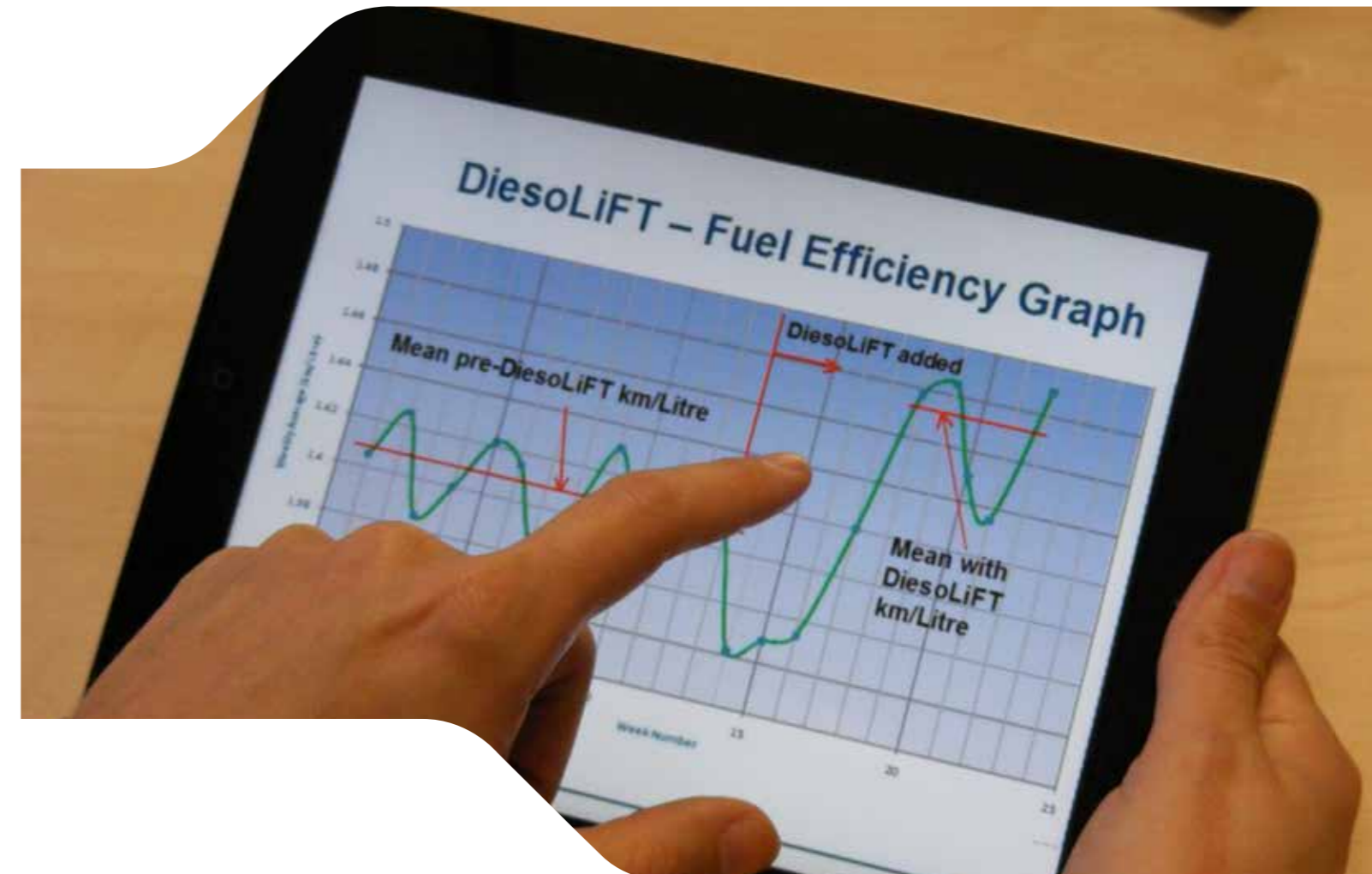
- 4% reduction in fuel consumption
- 43% reduction in particulate matters
- 28% reduction in carbon monoxide (CO)
- 7% reduction in hydrocarbons (HC)
- 4% reduction in NOx.

MI Technology UK Cummins NTA 855R3 high mileage dirty engine

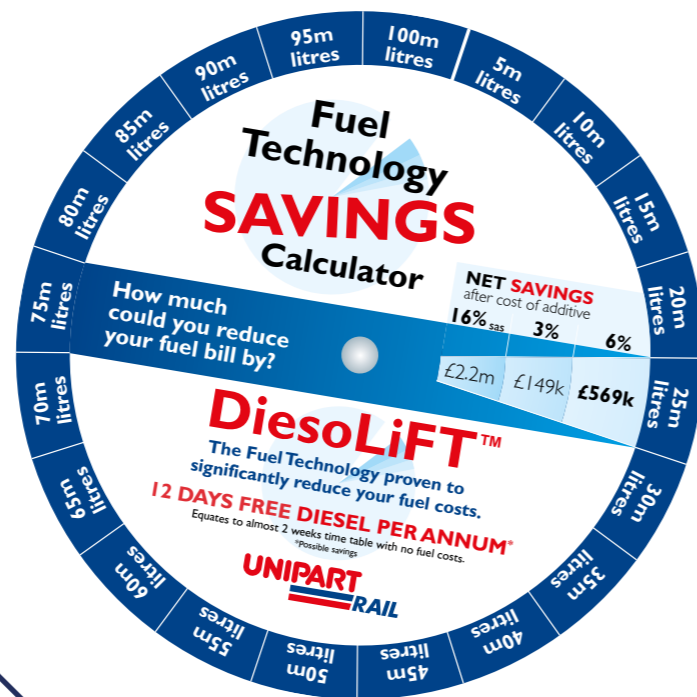
- 6.9% reduction in fuel consumption
- 95% reduction in particulate matters
- 24.6% reduction in exhaust smoke
- 12.8% reduction in carbon monoxide (CO)
- 4.3% reduction in hydrocarbons (HC)
- 8.2% reduction in NOx.

East Midlands Trains In service field trial 15X Fleet

- 4.4% fuel economy improvement.



Environmental and cost savings



If every diesel fleet operator within the UK was to use DiesoLiFT™, the following savings could be made:

Total approx diesel fuel litres used in UK rail,
650 million litres

Savings at **3% reduction**
£3.9m

3% reduction = 19.5m litres
= 51,675 tonnes of CO₂
Equivalent to removing
6750 cars from the roads
or **540 fuel tankers** moving fuel to **train depots**



Diesolift as part of the Unipart Rail Diesel Performance Solution can provide the following benefits to train and freight operators:

- Significant and immediate cost savings that self-fund any additional dosing equipment requirements
- Improved Engine Economy and Performance
- Improved Engine Reliability
- Reduction of Carbon Emissions and Environmental footprint

About Unipart

The Unipart Group is a leading UK manufacturer, full service logistics provider and consultant in operational excellence. Operating across a range of market sectors, including automotive, manufacturing, mobile telecoms, rail, retail and technology, Unipart offers a breadth of services to a wide range of blue chip clients internationally.

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