PLASMA TRACK

Leading the way in rail track cleaning technology.
Viewpoint 2022

Commercial Viability

PlasmaTrack \\ A new solution for an age-old problem

The problem of dealing with low rail adhesion in the autumn season is one of the major challenges affecting rail networks worldwide. ‘Leaves on the line’ is a serious issue with multiple consequences which several generations of low adhesion mitigation systems (LAMS) have failed to adequately address, even as the technology deployed elsewhere on rail networks has become steadily more sophisticated.

Low adhesion environments necessitate the running of special timetables that factor in the lower speeds and potential delays caused by the problem. This reduced service not only consistently causes reputational damage, but the reduction in passenger and freight miles that it leads to directly impacts on network profitability.

This is amplified by the fact that there is a very real economic impact to addressing the problem itself. Network Rail’s operation to deal with autumn leaf fall currently costs £65 million per year, while a further £290 million is lost due to penalties. That is an annual cost of £355 million to Network Rail alone, to say nothing of the impact that delays and the necessity of operating reduced timetables has on the wider economy.

However, it does not have to be like this. Using new technology that is both more effective and more cost-effective, as well as being more environmentally sustainable than current methods, it is possible for rail networks to enjoy summer braking conditions all year round.

Introducing PlasmaTrack

PlasmaTrack is a commercially viable and sustainable rail cleaning solution for the 21st Century. It introduces a whole new system for cleaning rail heads that restores the track to a clean, dry, and uncontaminated state able to support optimum braking conditions with a single pass. It enables trains to run as if under summer conditions all year round, leading to increased network capacity through closer running of trains and the end of seasonal timetabling.

The technology works by superheating compressed gas to form plasma energy, which is then applied to the rail head at approximately 700°C where it thermally ablates the compressed leaf layer. Plasma energy is used throughout industry for cleaning, sterilisation, and material deposition, but this is the first time it has been developed into a robust system suitable for deployment on rail networks.

It provides substantial benefits ›

The key benefits of PlasmaTrack

Complete removal of leaf layer and other contaminants including oxides

All contaminants are removed as part of the ablation process. That includes leaves and organic debris, iron oxides and wear particles, as well as artificial contaminants such as sand, oil and salt.

Creates a sterile surface retarding return of leaf layer

The process has a cumulative impact. After treatment the rail head becomes a sterile surface, which helps mitigate against the future build up of more materials. That means track needs cleaning less often, saving substantially on equipment wear and tear and service disruption.

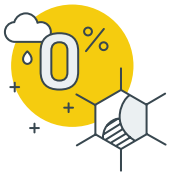
No consumable materials

The gas used to generate the plasma energy is nitrogen, which is freely available in the surrounding atmosphere. This is simply stripped out of the air by the PlasmaTrack equipment, meaning that no consumables have to be carried by the vehicles carrying out the treatment and no resupply logistics need to be considered.

No run off

Unlike current water-based treatments, there is no environmental impact of the Plasma Track treatment. The ablation procedure turns the leaf layer into gas, which dissipates harmlessly in the localised environment. It is non-toxic, with zero water table impact and lower fuel consumption per treatment mile.

No detriment to the track and infrastructure



Our technology is inherently low impact. In extensive testing it has proved to have no negative metallurgical effects on the rail head, and, because the effects are so localised, it has no effect on track signal circuits or any other rail infrastructure.

PlasmaTrack delivers improved removal of the leaf layer, minimising the impact on the rail environment and surrounding ecosystem. Its advantages don't stop there as it is also more cost-effective than competing technologies.

PlasmaTrack \\ Lower cost per kilometre

Lower cost per kilometre

One of the keys to PlasmaTrack's commercial viability is the speed with which vehicles mounted with the solution can operate.

Tests undertaken so far show that the system is effective at speeds of up to 60mph (95kph). This is significantly faster than currently deployed technologies and helps contribute to a 40% projected increase in treatment miles per vehicle. This enables uninterrupted treatment of areas of the track where adhesion is critical; including crossings, platforms, and points.

The lack of onboard consumables helps increase efficiency, and obviates the need to ensure supply chains are in place to ensure frequent replacements of materials. This leads in turn to a lower cost per mile treatment in comparison to other technologies.

Simply put, PlasmaTrack enables you to do more with less. It outperforms water jetting by 50% on speed and 40% on cleaning efficiency.

What's more, it is also a fully modular system. Low power — and lower cost — rapid deployment Road to Rail units function at up to 5mph (8kph) and replace manual cleaning efforts, providing cost-effective, targeted solutions for critical areas. High power RHTT and MPV units meanwhile provide high speed cleaning up to 60mph (95kph), ensuring consistent adhesion across the entire network, twenty four hours a day, seven days a week, all year round.

Built for the future

The PlasmaTrack system has not just been developed to address low adhesion now, but many decades into the future. It sits at the centre of a projected ecosystem that couples modular cleaning solutions with automated track sensing and data capture via the PlasmaTrack Intelligent Sensor. Based on RAMAN spectroscopy, this is being designed to identify black spots and apply remedial action before any operational issues develop.

A handheld device for track engineers will provide an instant good/bad condition indication, while track-side data logging provides network-wide coverage allowing SDS (Seasonal Delivery Specialist) teams to target efforts more efficiently and build up a reliable, predictive model to guide future operations via robust data analysis using Artificial Intelligence and Machine Learning. Lastly an on-board train driver feed-back system helps contribute to improved safety through alerts.

Work is also being undertaken to develop a low-energy passenger and train mounted solution, the low adhesion mitigation system (LAMS). The cumulative benefits of multiple lower energy heads would be seen over the full length of the train, and the system is being designed to be active during braking and initial traction acceleration, replacing on-train sand applicators. In this way it provides cleaning for following trains and provides a cumulative effect for the entire network, which is optimised via continual, low cost treatment to provide summer braking conditions throughout the year.

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The end of low adhesion

Low adhesion is an annual problem for rail networks that has year-round implications. It is a significant ongoing expense, the economic impact of which extends far beyond the challenges of dealing with the problem alone. Current technology is failing in its ability to comfortably address the issue too, with growing unhappiness at its effectiveness coupled with an acknowledgment of the environmental impacts of water jetting in particular. This is increasingly at odds with the criticality of maintaining sustainability targets.

PlasmaTrack offers a solution, and it is one that is not only technically superior, providing ideal running conditions year round, but economically advantageous as well. Across Europe alone, it is estimated that low adhesion costs the industry £1.3 billion each year. As an industry, that already does a lot to tackle the problems of low adhesion, there is now the opportunity to fully address the problem and reduce the figure substantially.

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› Technology

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