

ULTPAVE D GRAPHENE

Proven performance

Trialling graphene enhanced asphalt to improve durability on Walsall's roads

Exploring new materials

As part of a long-term approach to sustainable road maintenance, the client Walsall Council was interested in exploring new materials that could potentially enhance the durability of roads on their network.

They had received funding from Transport for West Midlands (TfWM) as part of the national Live Labs 2 project focused on decarbonizing local road networks, with active participation from Walsall Council and regional partners.

This program aims to integrate digital technology, sustainable materials, and innovative maintenance practices into the local highway network to achieve net-zero goals.

ADEPT Live Labs 2: Decarbonising Local Roads in the UK is a three-year, UK-wide £30 million programme funded by the Department for Transport that aims to decarbonise the highway network.

Graphene enhanced asphalts

One area of interest was how new and innovative materials like graphene could help to improve the performance of asphalt and extend pavement life thereby reducing whole life carbon emissions.

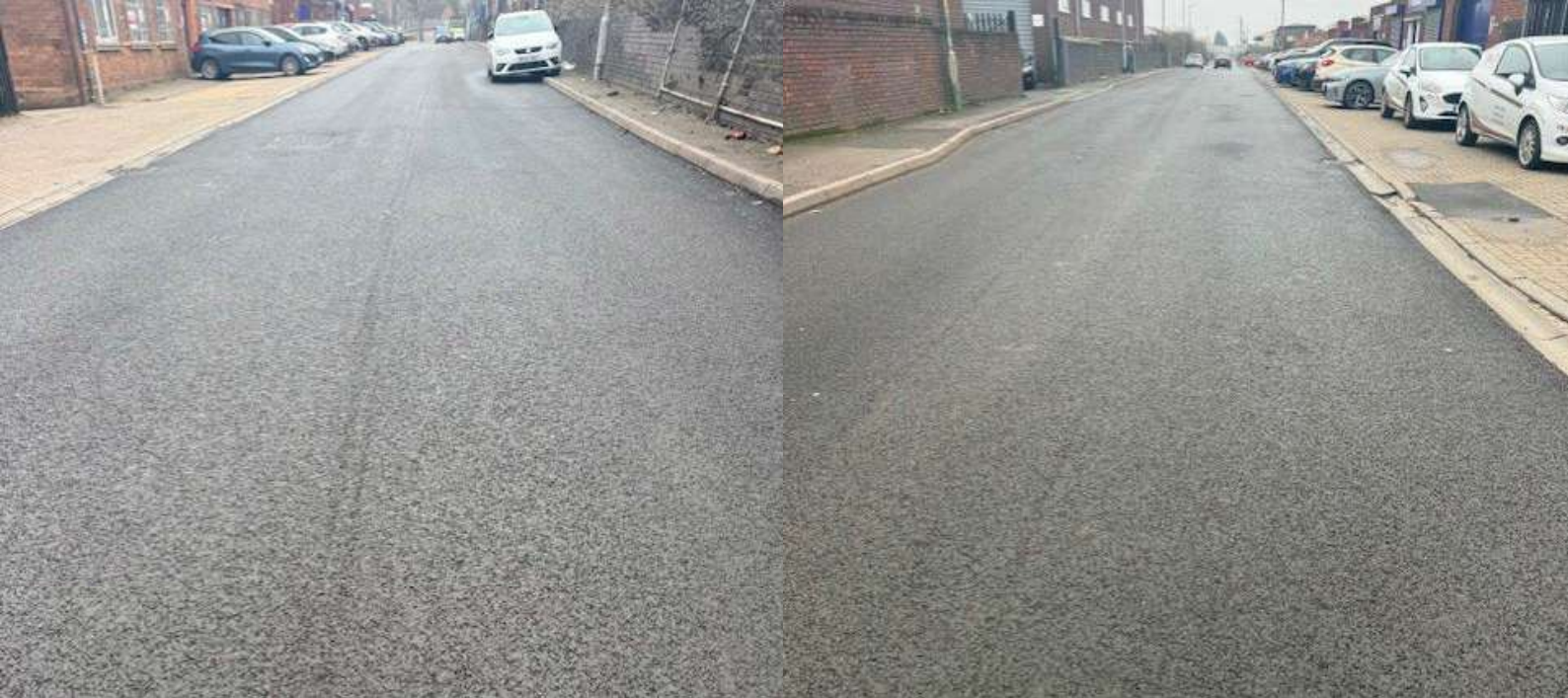
Graphene is a form of carbon made of a single layer of atoms arranged in a two dimensional hexagonal (honeycomb) lattice. It is very thin, essentially one atom thick, extremely strong for its weight and therefore has a very high specific strength and stiffness.

How can graphene enhance asphalt performance?

Supplier research suggests that incorporating graphene, even in small amounts, could significantly enhance asphalt performance because of its mechanical properties.

This indicates that adding graphene to asphalt has the potential to reduce rutting and fatigue cracking, improve fatigue resistance, improve weathering and aging resistance and therefore potentially extend pavement life.

This would reduce the number of resurfacing interventions required, reducing whole life cost and carbon emissions. Tarmac's early experience with graphene suggested it improves rut resistance, particularly for higher traffic volumes.



Head-to-head test of pavement durability

After looking for a suitable trial site, they identified Croxstalls Road, which serves an industrial area to the north of Walsall town centre, which was scheduled for resurfacing.

This road is in constant use by heavy goods vehicles, on a daily basis, with the road surface subjected to loading and surface abrasion from vehicles as they manoeuvre in and out of the many engineering businesses located on the road. The binder and surface course was suffering from visible cracking.

Tarmac's usual solution for this kind of challenge would be Utilayer S, which has a polymer modified bitumen binder and an impressive record of performance on challenging UK roads, so this would be used as the binder course and the benchmark surface course for the trial.

The question was, how would it compare to a surface course incorporating graphene?

After discussions with the client to understand the specific needs of the road and the scope of the trial, the proposed pavement designs for the trial sections would consist of a high performance Utilayer 20mm PMB binder course topped with alternative 10mm surface courses: an innovative Ultipave 10 D graphene enhanced surface course and a control section of Utilayer S 10mm PMB surface.

Installing the trial surfaces

As planned 380 tonnes of Utilayer 20 Binder Course was supplied and laid on Croxstalls Road, followed by 98 tonnes of Ultipave 10 D graphene and 150 tonnes of Utilayer S 10 as a control material.

The graphene was added as plastic pellets, containing specialist additives that would melt and disperse throughout the mix. Surfacing work was carried out successfully with an impressive finish achieved.

This section of road will now be monitored closely to evaluate the comparative performance of the alternative surface course materials.

The need for innovation and learning

There is now a widespread recognition amongst road builders that change is required to meet the complex challenges of the future.

Adopting new materials and methods that work for local networks will only be possible by thoughtful collaboration between local authorities and material suppliers, that brings together the detailed knowledge of the local road network that highway maintenance teams possess, with the knowledge of new and emerging materials technology.

Building roads that last longer and tackling problem roads

Building roads that last longer helps to address many of the challenges faced. It helps to optimise return on investment for taxpayers, reduce long term disruption for road users and local businesses and help to minimise long term energy and carbon emissions by avoiding future resurfacing interventions.

For more details visit: [tarmac.com](https://www.tarmac.com)

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