

Tarmac

Lighter shades seek role in energy reduction

Tarmac's latest offer could be just what highway authorities are looking for – an asphalt that allows lighting to be turned down without a reduction in visibility.

Application of coloured asphalt in tunnels has revealed great potential for materials like Tarmac's Mastertint to play a significant part in efforts to reduce energy use. Lighter colours in varying 'degrees of greyness' are being talked about as a means for maintaining good visibility while lighting is turned down to reduce energy consumption.

Key to it all is increasing the amount of light a road surface will reflect. Tunnel operators in Europe have already seized upon the potential by laying asphalt in lighter shades of grey and showing tunnel lighting can be reduced by half as a result.

Tarmac is close behind them with an ideal solution for UK tunnel operators. The contractor and material supplier's Mastertint coloured asphalt is produced by mixing a blend of aggregates, cellulose fibres and Shell Bitumen's Mexphalte C polymer modified clear synthetic binder.

Mastertint was initially designed to provide coloured surfaces that can withstand the rigours of bus lanes and hardstandings; to provide necessary skid and scuff resistance while retaining colour over a period typical of the best asphalt surfaces. The clear and polymer modified

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binder provides performance and maximum effect from any pigmented additive and the mineral colouration of the stone in the asphalt mix – colour that does not fade.

This ability to regulate colour has

previously been used to good effect for providing aesthetic surfaces and is now what tunnel operators are seeking to enhance reflectivity.

"Installations of Mastertint in tunnels are coming up in the UK. A number of tunnel operators are interested," says Tarmac Quarry Materials' National Special Products Manager James Freeman. "This is a new market for the material and a new strategy for us, based on our experience of using Mastertint in the UK, combined with results from European research projects and discussions with contacts abroad."

The International Commission on Illumination – commonly known as the CIE for Commission Internationale de l'éclairage – has concluded a three month study on the visibility of pavement materials. This measured specular reflection, luminance and clarity of a range of types of road surfacing, including concrete with white cement. 'Clear' asphalt came out top in each test and by a considerable margin.

"The potential for reflectivity from aggregate such as quartzite is best or even fully exploited in an asphalt material with a clear binder. Quartzite is also suitable for highways as a type of stone with very good properties of skid resistance. With a light coloured pigment additive and lighter coloured aggregates and the polymer modified binder, we can produce a durable asphalt that will quickly weather to a very light grey with high reflectivity," says Freeman.

Measure of the greyness of each

A number of tunnel operators have shown interest in applying Tarmac's Mastertint asphalt as a means for reducing energy consumption





Light coloured asphalt has been laid in tunnels in Europe and delivered light savings of 40%; allowing operators to reduce lighting costs by half

Mastertint mix will be part of the scientific approach to be taken in similar fashion to pilot projects in Europe, Freeman says. One of these, in the Confignon Tunnel near Geneva is reported to have delivered light savings of 40%. One 'spotlight' in every two has been turned off in the tunnel and the electricity savings recouped the additional road resurfacing costs within four years.

Room for use of light coloured asphalt in tunnels in the UK is limited in comparison to Switzerland, but pilot schemes and discussions could lead to a natural migration of the technology to all sites where authorities are looking to reduce or 'dim' their street lighting. Lighter and more reflective asphalt surfacing with high skid resistance also carries great potential for use as an additional safety measure at road junctions – particularly in rural locations where addition of lighting is difficult.

"At present we do not know how far this technology could go in practical terms, but potentially its application is huge. Highway authorities throughout the UK are looking for ways of reducing their energy consumption," says Freeman.

A County Surveyors' Society report has stated that local authorities could save up to £35M annually just by slight reduction of lighting levels at times of minimal traffic.

Many councils are piloting photocell and 'dimming' technology that reduces the time lighting is switched on, while some are introducing low wattage lamps with clearer 'white' light in place of yellow sodium.

Controversy surrounds such initiatives, however. Authorities that have selected to reduce or turn off lighting altogether in some areas have met criticism due to issues of public safety. The message from Tarmac is that lighter coloured or more reflective asphalt surfacing can be combined with new lighting technology to maintain visibility while energy is reduced.

"Application of light coloured asphalt has great potential for this purpose, but requires the right mix and type of high grade aggregates," says Tarmac's Senior Manager for Aggregates & Asphalt David Markham. "Reflectivity is a function of the binder and aggregate combined and the stone also has to be suitable for ensuring durability and skid resistance. All of this can be designed into a Mastertint asphalt mix which will perform as well as other high performance materials."

Mastertint is designed as a conventional Stone Mastic Asphalt (SMA) material with durability gained from relatively high binder content – 'thick films' on the aggregate, but with Mexphalte C in place of a conventional

bitumen for colouration.

"The SMA type of mix is very good for resistance to deformation and we can control texture depth with different stone types from 6mm to 14mm in size," says Markham. "With regard to production of Mastertint mixes, equipment has to be clean to avoid contamination. Everything else – the pavement design, layer thicknesses, paving process and equipment – is the same. The key difference is the colour which can be matched to suit requirements, including lighter shades for greater visibility."



Light grey Mastertint has great potential – for allowing energy reduction without detriment to visibility or for enhancing road safety

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