ROADS

Roads get grinding and grooving

As budgets get squeezed, different approaches to cost-effectively extend the life of roads are being examined. One of these currently being examined by the Highways Agency is diamond grinding and grooving. Successfully used for many years in the United States, the process restores the surface performance of concrete road at less than half the cost of overlaying the concrete with asphalt.

In addition to cost savings, the process is fast, is environmentally friendly as it has a lower carbon footprint than an asphalt overlay and provides a road surface that is noticeably quieter than untreated concrete as traffic driving over a textured surface emits less noise than when driving over a smooth surface.

Grinding and grooving involves plant equipped with closely-spaced diamond-tipped saw blades that cut drainage and traction grooves into the tired road surface. With grinding, 3mm to 10mm of the concrete pavement is treated to leave a level, high performance riding surface. The closely spaced grooves left after grinding provide a high level of texture and friction. The same technique and plant is used for diamond grooving. Whereas the purpose of grinding is to restore ride quality and texture, grooving is generally used to reduce hydroplaning by providing channels for water drainage. In terms of design, the main difference between grinding and grooving is in the distance between the grooves – about 6 times greater for grooving.

Introduced into the UK by Concrete Cutters (Sarum) Ltd, in partnership with UK abrasives company, Tyrolit, the diamond grinding technique is half the cost of overlaying concrete with asphalt, is much faster and requires considerably less investment in capital plant.

Last year, the Highways Agency has carried out a series of grind and groove trials in East Anglia at Alconbury Airfield, Cambridgeshire, between the A318 and A1114 junctions on the A13 Chelmsford Bypass, Essex, and on the A12 Chelmsford Bypass. Further trials have been carried out on the 1.61km of the A12 Kelvedon, in both directions, 745m of the A12 Chelmsford Northbound, 1km of the A11 Ketteringham Northbound and a major maintenance project on the A14 near Ipswich has used the technique. Early indications from accelerated wear tests are that the surface is durable and will retain its skid resistance and noise attenuation characteristics for many years. There has been a significant improvement in skid resistance of 54 per cent. Reductions in noise levels compared with a smooth concrete surface with traffic flowing at 30 to 50mph range from 4 – 6dBA. TRL is monitoring all the sites and at higher vehicle speeds the noise reduction is even more apparent. It is anticipated that the results of the TRL study will be published later this year.

The first major project on the A14 involving four 6km land with a total area of 125,000 sq m was successfully completed in May. The main contractor was VolkerFitzpatrick and the scheme was carried out within Highways Area 6 and was supervised by W.S.Atkins.

Experience in California, a pioneer of the grind and groove technique, has found that whilst asphalt overlays typically last 8 to 12 years, the average life span of a diamond ground concrete surface is up to 17 years and a pavement can be diamond ground up to three times without significantly affecting its structural performance. Other benefits include that the process can be carried out during off-peak hours with short lane closures and without encroaching into adjacent lanes. Grinding one lane does not require grinding of the adjacent lane which may still have acceptable surface friction and drainage and the clearances underneath bridges are not affected.

It is estimated that there are nearly 1,350 lane kilometres of concrete roads in the UK that need attention. With its considerable potential cost savings and long term performance benefits grinding and grooving offers the enticing possibility of its being used on new build and major reconstruction road projects. This has successfully been done in the USA and, in a time of cut backs and slashed budgets, could result in concrete roads making a surprising comeback in the UK.