

Moving works: Four-wheel-drive and twin-axle steering make the machine manoeuvrable. Light 'StopGo' traffic control is generally sufficient during operation.



## Rough treatment

As road safety targets loom, highway authorities are turning to specialist plant to restore road surface skid resistance with minimal traffic management. **Phil Mason** explains.

Keeping road surface skid resistance above investigatory levels can make a significant contribution to road safety. But, all too often, surface treatment to remedy wet weather skidding tends to be reactive, piecemeal, and only focus on accident hotspots, due to budgetary pressures.

Now, in a bid to find a more cost-effective, cyclical solution for the wider treatment of skid resistance issues, highway authorities are turning to a machine which 'bush hammers' the road surface. Bush hammering is recognised in the Design manual for roads and bridges (DMRB) as a technique for restoring pavement friction by impacting the aggregate in the road surface with small hardened-steel hammers to roughen the aggregate surface. Using 84 independent computer-controlled bush hammer heads, the Klaruwx190 (K190) controlled mechanical restorator plant reworks any natural aggregate road surface, regenerating micro-texture – and, therefore skid resistance – to compliant levels.

Although the K190 process is not new to the UK, there is a new wave of interest because of the operational benefits of the process in 'fast-tracking' skid resistance to needy roads. Compared with the application of new material to restore skid resistance, K190 is quicker – covering up to 3,000m of lane a day – and less expensive, at about 20% of the 10/m cost of surface replacement. It also has a

lower carbon 'footprint' than applied materials, since it generates less than 7% of the carbon dioxide per lane km of hot-laid overlay.

And the modern emphasis on sustainability has further strengthened the case for K190: restorating by eliminating the use of new surfacing and the carbon footprint associated with its quarrying, production and transport. Plus, as the process does not involve painting, it also produces minimal material for disposal.

Flintshire County Council has been using K190 restorating since 1996, but its roads have benefited from the process for longer. Before it was disbanded under local government reorganisation, Cwyl County Council used the technique for 12 years.

A long-standing and proven procedure within the council's road-maintenance programme, it continues to deliver benefits which satisfy budget considerations and help meet targets for road network condition, in line with statutory performance standards. Benefits of the K190 process cited by the council include effective restoration of skid resistance demonstrated by SCRIM results, significant cost savings, speed of works, and the ability to carry out treatment in wet weather.

David James, head of neighbourhood strategy and policy at the council, has 25 years' experience of using Klaruwx restorating. He was a principal engineer with Cwyl County Council before he



transferred to Flintshire and, for him, regenerating and extending the useful life of existing pavements is just part of the appeal. 'We are better off restorating a road surface and bringing it back to life, as no new materials are required such as with resurfacing or surface dressing. We can use Klaruwx's process several times for the cost of an inlay,' he says.

Pavements are assessed structurally to ensure they are sufficiently sound for restorating, and Klaruwx engineers visit site to consult on the potential effectiveness of the process for different types of surface course.

James says: 'We see definite improvements following Klaruwx's restorating. SCRIM results always confirm gains in skid resistance after treatment, as high as the aggregate quality allows.'

The process is used on all parts of Flintshire's 1,089km network of A, B and C-class roads, where it is assessed to be of benefit in restoring skid resistance. This includes applications on bends and in braking zones, such as the approaches to roundabouts and pedestrian crossings.

Some of the most impressive results in Flintshire have been observed on hot-rolled asphalt (HRA), but the restorating is effective on most wearing courses, including stone mastic asphalt, thin overlays and surface dressings, and concrete. Computer-controlled, independently-rotating treatment tips adapt to the pavement surface profile, allowing deformation and even wheel track rutting to be effectively treated. These individual working heads can be switched on or off in order to provide full or partial width coverage, and to ensure treatment is consistent even in the wheel tracks.

This selectivity also ensures road markings, detector loops and non-trafficked areas are avoided, saving the cost of their replacement following treatment. Additionally, as there is no preparation of the road surface required, ironwork, road studs and kerbs do not need to be raised or marked as they do with overlay. 'The process is much quicker and less disruptive, with no digging-out or resetting of existing gullies and manhole covers,' says James. 'It can also be carried out in wet weather.'

This latter element of flexibility ensures that works can be programmed for any season in order to minimise traffic disruption. Delays are cut further because traffic management is straightforward.

Operatives are not required within the work area and the operation is classed as 'moving works'. Positive control of traffic allows 'sideways clearance' to be at a minimum and avoids the need for road closures in most instances.

Each K190 machine is capable of treating a width of up to 5.6m, working at typical forward speeds of 4m to 8m per minute for optimum results, depending on the surface type. Two machines can be used in echelon formation, in order to treat a full lane width in one pass without overlap of treatment, thereby maximising productivity and minimising disruption.

Treatment is usually carried out with simple, progressive 'Stop/Go' traffic control, with treated sections of road being usable immediately.

If an emergency arises, the machines can be removed from the road mid-treatment and the work resumed later – without affecting the success of the process. And, despite the apparent size of the plant, four-wheel-drive and twin-axle steering enables K190 machines to manoeuvre in restricted areas, turn in their own length, and work close to obstructions.

By comparison, the use of surface dressing to improve skid resistance needs plant and labour, and is process-intensive. This requires significant traffic management and disruption to motorists, including temporary speed restrictions after application to allow it to settle in. High-friction dressings, thermoplastic-based screeds and two-part epoxy resins with bauxite inclusions offer cure time.

Thermoplastic screeds do not perform any structural function either, but are sometimes laid with the misconception that they will fill in or remedy defects. But shear forces carry through to the layers beneath, so any form of instability will surface in time, undermining structural and skid-resistance performance.

The usual course of action is to plane the surface, replace the support layer, and re-apply new high-friction material. With bush hammering, however, the aggregate remains viable, so that defects are not masked, and skid-resistance values at the surface are not affected by underlying deterioration.

Highway authorities are under pressure to improve road safety and meet challenging annual maintenance targets. With budgets hard-pressed during the recession, they are looking for a process which can achieve more for less, and the K190 process could certainly fit the bill.

• **Phil Mason** is regional manager of Klaruwx RME.

