

The Infrared RoadMASTER (IRMA) heater

Modern technology to save highway repairs

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With New Forest
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Services,
Highlights the
Development of
New methods for
protecting
Britain's
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New methods for protecting Britain's Roads and environments.....

Gone are the days of the jackhammer, the profiler, noise and landfill—road repairs are now becoming hi-tech. New Forest Council (NFDC) is one of the first councils in the south to adopt the new environmentally friendly method for repairing potholes in the highway.

The system, which recycles existing surfacing in-situ, is not only kinder to the environment, but is also proving to be cheaper, quicker and better than traditional methods of road patching and repair. The system uses infrared heat discovered in the 1800's to heat up the asphalt on road surfaces, recycle and re-lay it in a matter of minutes.

Why the need for a new system?

In recent years, highway engineers have been put under increasing pressure to find ways of maintaining the country's roads against the backdrop of reduced budgets. Increased traffic flow and mounting concerns over the environment

The Government's attempts to reduce the amount of waste material ending up in landfill sites through the introduction of the landfill Tax has increased this pressure, and this year the Aggregates Tax, which aims to reduce the amount of new material being extracted from quarries, has also been introduced.

The cost of traditional patching is increasing every year, the cost of disposal is up, purchase of fresh

tarmac is up and labour and plant costs are also increasing - so something had to give. In the light of all these changes a new method of highway repair is timely, if not essential. The Infrared Patching System has evolved into a practical and efficient means of asphalt maintenance. The system is now in use extensively in the USA and in many other countries around the world.

Its use in the UK is now slowly being realised after six years of trials and demonstrations by Asphalt Rejuvenation Ltd. NFDC, in conjunction with Hampshire County Council, carried out such a trial in 1999 and after technical and financial assessments the system was purchased by NFDC in June 2001.

Since then the system has proved a huge success, not only with the operatives using it but also because of the reduced costs, both in financial and environmental terms.

How the system works

If left untreated the surface of any road will begin to deteriorate after just three to five years. The process of oxidation causes failure of the binder in the asphalt and together with the effects of weathering and increased traffic this quickly leads to crazing of the surface, the loss of aggregate and eventually full deterioration, resulting in potholes.

MODERN TECHNOLOGY TO SAVE HIGHWAY REPAIRS

During periodic inspections the local Highways Inspector normally marks out the extent of the highway repairs in spray paint. The Highways Inspector's job is becoming increasingly more difficult as budgets are cut and the amount of repairs he would like to get done have to be governed by how far his budget will stretch. Increased traffic compounds the problem as surfaces are wearing

out quicker and more maintenance is required.

Infrared repairs are one method of helping to keep road surfaces serviceable.

Another is spray applied rejuvenation emulsion, which as a form of proactive maintenance can extend the life of the surface much longer.

By introducing a rolling programme of spray applied emulsion the surface can be maintained to more fixed budgets making the Highways Inspector's life much easier.

The old method

After inspection of the surface a gang of four or five men, in two large lorries, would turn up to set up the signing and guarding of the site in accordance with the Traffic Signs Manual, Chapter 8. Once the site was safe they would then start up a

floor saw to cut around the patch. Once this was done they would then start up a noisy compressor with even more noisy heavy-duty breakers to break out the old asphalt.

The use of breakers is very hard on the operatives and has resulted in the now common term 'white finger', the result of vibration, which can cause irreversible damage to the hands. The old asphalt is loaded into a lorry for disposal to a landfill site or sometimes to a recycling plant if there is one in operation nearby.

The sides of the patch are then treated with a sealing

compound and the hole filled with fresh, hot asphalt,

kept warm in an insulated tipper body carrying typically 16 tonnes. Once filled, the patch is then compacted with a vibrating roller and the edges sometimes sealed with hot bitumen.

This method of repairing potholes is time consuming, results in excavated material having to be disposed of, uses raw materials to fill the hole and requires a lot of labour and plant for the whole job.

The new method

The infrared process can be used to repair the potholes much more quickly and efficiently. Firstly it is only a two or three man operation. After setting up signs in accordance with Chapter 8 but over a much smaller area of the highway, the Recycler, which is easily towed behind a van or lorry to site, is put to work within five minutes. The unit is quickly unfolded to cover an area 2.4m x 1.8m (4m²) and is totally self contained.

The system works by heating a ceramic blanket using propane, which then transmits infrared heat into the road surface. The asphalt is gently heated to a depth of 50-75mm over a period of 8-12 minutes.

Once the surface has reached a temperature of between 100-150°C the unit is then pulled forward to begin heating the next patch. Whilst this happens the softened asphalt is raked around, and rejuvenation liquid, which is a water-based emulsion, is added to replenish the binder content of the old asphalt material. New material kept in a small hot box of 1.5 tonnes capacity is added if needed to top-up any depressions. The area is then re-raked, leveled and rolled leaving a hot welded patch all round.

The benefits

Environmental:

- All of the existing tarmac surfacing is recycled;

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- Material sent to landfill has been reduced by 90%
- Use of new material has been reduced by 85%;
- The use of plant-using diesel engines has been reduced; one lorry is needed instead of two;
- There is no need for noisy compressors and breakers. Road repairs in town centres can be carried out without disturbing residents;
- The impact on the flow of traffic is dramatically reduced;

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only a small working area is needed, without the need for coning off large sections of the highway. Disruption is kept to a minimum.

Operational:

- Much improved efficiency and output from smaller gangs;
 - Easier and quicker to set up and get working, less down time;
 - Much safer and easier for operatives, reduced noise, no 'white finger' problems with jack hammers not required ;
 - Reduced potential for damage to underground services, as no excavation is needed. Telephone lines and electrical supplies remain in service;
 - Any sized patch can be repaired; can be continuous without the need to cone off huge areas of the highway;
- Leaves a heat sealed patch meaning less chance of water ingress and future damage.

Quality

The quality of the repair using the infrared system is better. By introducing a heat sealed edge to the patch this prevents the ingress of moisture at a later date. The cause of many failures to patch repairs is the cold joint saw cut around the edge of the patch.

This allows the ingress of moisture, which during the winter months especially is susceptible to frost damage and softening of the road sub-base. The integrity of the highway surface is maintained with a more uniform surface without any weak points.

New Forest District Council has been able to reduce the cost of patching repairs locally around Lymington, where the machine is in daily use, by 30%. Little or no waste material is going to landfill and the use of fresh tarmac has been reduced to just 15% of its original amount.

Any conscientious Highway Engineer cannot ignore the use of this technology. All county and local authorities should consider the use of this method of patching for the benefit of the taxpayer, road user and the environment.

Financial:

- The cost of disposal is reduced by 90%
- The cost of buying new material is reduced by 85%
- The cost of running lorries and plant is reduced by 30%
- The cost of patching is reduced by 30%. The cost of highway repairs, inconvenience to road users, and disturbance to business and householders is reduced dramatically.



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