pavement work tips

High Pressure Water Retexturing

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INTRODUCTION

High pressure water, applied using large purpose-built machines, is an efficient means of removing excess bitumen from the surface of asphalt and sprayed seals.

The primary application of such machines, as described in this pavement work tip, is retexturing of bituminous surfaces by removal of excess surface bitumen.

Other applications of the same machinery include cleaning and retexturing of concrete surfaces, removal of rubber from aircraft runways and the cleaning of open graded asphalt wearing course.

THE MACHINERY

Equipment is purpose-built and truck based. Machines currently in use in Australia and New Zealand are of two major types.

One type of machine comprises water jets set in a series of rotating cutting heads mounted on the truck (Figure 1). Units are of two sizes. The smaller unit has three cutting heads of approximately 700 mm diameter mounted at the rear of the truck to provide a total effective width of 2.3 m. The larger unit has two further centrally mounted cutting heads that can be extended to provide a total width of 3.45 m. Each of the heads can be operated independently for treatment of selected areas such as wheel paths only.

Figure 1 Surface Cleaning Machine with Truck Mounted Cutting Heads

The other type of machine has a single cutting head towed behind the truck via an "umbilical" connection (Figure 2).

Both machine types include tanks for the supply of fresh water and storage of collected water and detritus.

Key Summary

This issue of 'pavement work tips' provides a guide to the retexturing of bituminous surfaces by using high pressure water to remove excess bitumen

Figure 2 Umbilical Ultra High Pressure Watercutter

Precise control of pressure, water volume and speed allows effective removal of excess bitumen and surface contamination with minimal damage to the surface or dislodgement of coarse aggregate particles. Powerful suction heads are used to collect water and detritus from the surface for later disposal.

Operating pressures and water volumes vary significantly between the two machine types. The truck mounted rotating heads operate at pressures of up to 800 or 1000 bar (11 000 or 14 000 psi) and a flow rate of up to 33 L per minute from each rotating head. Pressures as low as 100 bar (1400 psi) may be used when cleaning open graded asphalt.

The umbilical machine operates at an ultra high pressure of up to 2500 bar (36 000 psi) and a water velocity of around 400 m/s. This uses a much smaller volume of water with the result that total usage, for the same area of

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treatment, may be only about 12% of that of other machine types.

APPLICATION

The process is most effective on sprayed seals and asphalt showing loss of texture due to flushed bitumen.

A typical example of improvement achieved with a single pass is shown in Figure 3. Surface bitumen has been removed from a flushed sprayed seal to expose the well-textured aggregate surface on the right, compared to the existing flushed surface on the left.

Figure 3 Cleaned surface

The process is largely independent of weather and can be operated in cold, damp or wintry conditions where other resurfacing options are not feasible. Wet surfaces should, however, be avoided, as well as treatment of badly flushed surfaces in hot weather where is a risk of pick-up on the tyres of the slow moving vehicle.

Retexturing should not be used on primerseals and other thin initial seals where rapid failure may occur as a result of insufficient remaining bitumen to adequately hold the primerseal or seal in place.

Care must also be applied when treating very weak and previously patched pavements. Contingency plans may be needed for restoration of patches damaged by the retexturing operations.

HEALTH, SAFETY AND ENVIRONMENT

Noise from the operation requires the wearing of hearing protection and noise levels must be taken into account if considering night work in residential areas.

Eye protection must also be worn in the vicinity of the operating machine as some small stones and grit can be dislodged and flicked out by the process.

Waste materials must be disposed of in an approved environmental manner. Depending on the process, a typical day's operation may collect up to 2-3 cubic metres of solids and use up to 40 000 L of water.

Disposal is covered by state environmental regulations. Waste disposal classifications must be determined before commencing work. Classification of liquid wastes and solid wastes that may liberate free liquids when stockpiled, transported and disposed of, are particularly important. All stockpiled waste materials must have environmental controls in place to avoid pollution of the surrounding environment.

COST EFFECTIVENESS

Cost of the treatment will depend on the size of the project. Larger machines may treat some 3000 to 6000 m^2 in a single shift.

Life expectancy of the treatment will be influenced by the underlying cause of bitumen flushing and the likelihood of further aggregate embedment or bleeding of binder. In most cases, several years should elapse before further retexturing or resurfacing is required.

A significant advantage in retexturing, compared to retreatment, is that it removes the excess build-up of bitumen that would otherwise make further sprayed seal treatments difficult to apply without the risk of a repeat of bleeding and loss of surface texture in the new seal.

Improvements in the microtexture of aggregates tend to be short-lived with pendulum friction values returning to pre-existing levels after a relatively short period of trafficking.

REFERENCES

Pavement Work Tip No. 7 (1997) Treatment of bleeding or flushed surfaces.

VicRoads Technical Note 62 (2002) High pressure water retexturing.

For more information on any of the construction practices discussed in "pavement work tips", please contact either your local Austroads representative or AAPA — tel (03) 9853 3595; fax (03) 9853 3484; e-mail: info@aapa.asn.au

A complete list of "pavement work tips" issues is available on AAPA's web site (www.aapa.asn.au) and all issues may be downloaded free with Acrobat Reader. Copies may also be obtained from AAPA.

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