

Asphalt shape correction

pavement work tips — no. 30

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INTRODUCTION

This Work Tip provides a guide to correction of shape of asphalt surfaces and is supplementary to two previous work tips:

Work Tip No. 3: *Asphalt Riding Quality* provides advice on achieving smooth riding asphalt pavements through job planning, skilled operation of paver level controls, achievement of smooth consistent paving and materials flow through the asphalt paver, proper construction of joints and uniform surface compaction.

Work Tip No 10: *Asphalt Paving with Automated Level Control* provides a guide to the selection and use of automated level control systems.

GENERAL

Two important factors in planning of asphalt shape correction and regulation are:

- The effect of differential asphalt compaction on varying depths of material.
- The ability of the paver and level control system to place asphalt to the desired surface profile.

INFLUENCE OF ASPHALT COMPACTION

The density of asphalt spread by the paver is around 80 to 85% of the design compacted density. This will vary slightly depending on the screed system and mix characteristics but, as a general rule, a 15 to 20% reduction in volume (thickness) will occur under rolling.

Asphalt placed in depressions will thus compact more under rolling due to the greater depth of loose material. For example, a local 10 mm depression could result in a depression of up to 2mm in the finished work. A 50 mm depression could result in a depression of up to 10mm in finished level unless regulated beforehand (see Figure 1) or compensated for by altering the thickness of asphalt being spread).

To obtain good surface shape and ride quality it is therefore necessary to make allowance for variations in compacted thickness when determining loose levels for spreading, or to

correct surface shape by preliminary regulation or cold planing.

Shape correction is particularly important when placing thin surfacing layers and where there are rapid changes in surface shape.

Rapid changes such as isolated mounds, hollows, sunken service trenches and potholes can cause:

- Dragging on high spots
- Reflection of the shape of depressions in the finished surface.

Key Summary

This issue of 'pavement work tips' provides a guide to improvement of pavement ride quality through asphalt shape correction and regulation

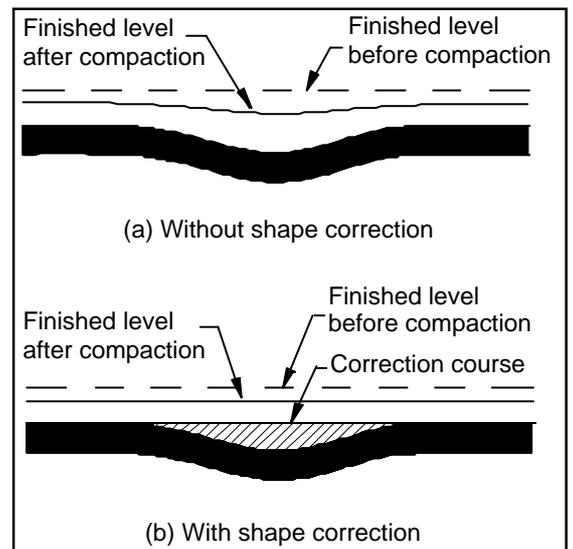


Figure 1. Shape correction

INFLUENCE OF LEVEL CONTROL SYSTEM

Where longitudinal shape correction is involved, the surface profile achieved by the paver screed will be influenced by the level control system.

The floating screed asphalt paver ensures a smooth transition between changes in paving thickness and correction over short lengths of

continued on reverse



minor shape variation in the underlying pavement. Shape correction over a greater length can be improved by using a mobile reference device or levelling beam that averages the surface shape over the length of the beam.

Where shape or thickness correction is required over a length greater than that spanned by the paver or levelling beam, it is necessary to make adjustments to the thickness of asphalt being spread. Adjustment should be based on survey information and applied by:

- manual adjustment of thickness controls
- string line, or
- computerised level control.

Figure 2 shows the combined effect of differential compaction and level control method on effectiveness of shape correction when no compensation is made for loose thickness of spread material.

This effectiveness varies with the length of the bump or depression being corrected and falls off rapidly once the length of the variation exceeds the length of the paver (around 4 m) or the length of the levelling beam, if used.

For example, a little over 20% of the effect of a 10 m long shape variation will be reflected if a 9 m levelling beam is used but some 55% of the existing variation will be reflected by a paver.

Placing by stringline is not affected by the length of the bump or depression, although about 20% of the existing variation will be reflected in the new surface due to differential compaction unless compensation is applied to the loose thickness of asphalt being spread.

Computerised level control systems usually apply a factor to compensate for loose thickness.

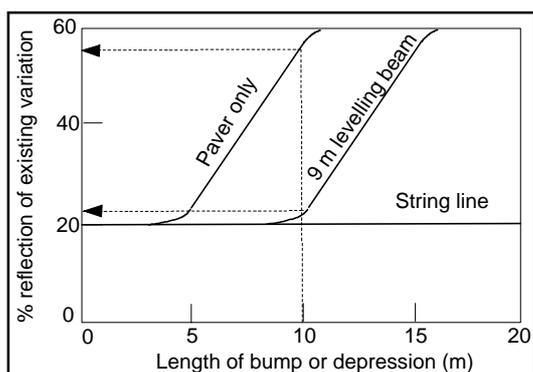


Figure 2. Effectiveness of level control system in reducing shape variation

CORRECTING SURFACE RUTTING

The need for some form of correction prior to placing a new wearing course is influenced by the potential differential compaction, the thickness of layer and depth of rutting. The following guidelines are provided to minimise the effect of rutting being reflected in a new asphalt surface.

- Rut depth less than 10mm
Regulation not generally required except when required to ensure free drainage of open graded materials or to avoid significant thickness variation in ultra thin surfacing.
- Rut depth 10–30 mm
Regulate with suitable asphalt mix provided that existing asphalt is stable.
- Rut depth greater than 30 mm
Generally the surface should be planed back to a uniform surface. Rutting of this depth is often an indicator of unstable asphalt materials that should be completely removed to reduce risk of further rutting. This may involve removal of up to 50 mm or more of asphalt, or removal of a complete layer, to ensure elimination of all unstable materials.

SELECTING MATERIALS FOR REGULATION

Where separate regulation layers are to be placed prior to resurfacing, the size and type of asphalt should be selected in accordance with the performance properties required and the thickness of material being spread. Normally a dense graded asphalt is used with a binder type suitable to the performance application.

The size of asphalt may need to comply with conflicting aims. Generally, the larger the size, the greater the stability of the mix, but smaller sizes provide greater workability and ease of tapering to thin layers. Table 1 gives an indication of size of dense graded asphalt suitable for most applications.

Thickness of shape correction	Asphalt size
Isolated areas and rut depth <20mm	7mm
Extensive areas or rutting 20–30mm depth	10mm
Extensive areas, >30mm depth	14 or 20mm

Table 1. Suggested asphalt sizes for regulation

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