

# Asphalt Paving with Automated Level Control

pavement work tips — no. 10

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## INTRODUCTION

The purpose of this technical note is to provide guidance for selection and use of automated controls for asphalt paving works to achieve improved shape and ride quality.

Automatic level controls can follow a fixed or mobile reference point to achieve a particular surface profile or correct minor shape variations in the base.

## THE FLOATING SCREED PAVER

The fundamental principle of the asphalt paver is that the screed unit “floats”, i.e. it is only attached to the tractor unit at the forward end of the tow arms. The paver screed is supported by the mixture being spread and will find its own level with the surface of the screed plate parallel to the direction of pull.

Due to this floating action it is important to keep a uniform amount of material in front of the asphalt screed and maintain a steady forward speed with a minimum of stopping. Changes in temperature of the asphalt will also affect the uniformity of surface level and finish.

If no adjustment is made to paver controls, the paver will place a uniform thickness of asphalt, smoothing out small variations in shape of the underlying surface due to the gradual response of the screed level to any change in the position of the towing arms.

Changes in thickness are made by changing the angle of the screed plate relative to the towing arms, or by raising or lowering the tow point relative to the tractor. Changes in screed angle will result in a gradual increase or decrease in the thickness of material being spread until the screed plate is again parallel to the towing plane.

Manual adjustments to screed controls must be fed in gradually, several metres ahead of where the altered thickness is required. Failure to properly anticipate manual level changes can result in over-correction and poor shape and ride quality of the finished surface.

Automatic systems maintain the tow point at a constant height relative to the reference system.

## AUTOMATIC CONTROLS

The two most fundamental automatic control systems are the joint matcher, which follows an adjoining surface, and the levelling beam, which acts as a mobile reference.

Other systems, which are less commonly used, include fixed stringlines, crossfall control, and electronic control to predetermined level data.

### Joint Matcher

The joint matcher can be a short shoe riding on the surface beside the machine or a sonic sensor. The joint matcher is particularly useful where there is a suitable reference such as a previously laid asphalt mat or concrete kerb and channel (see Figure 1).

Joint matchers can be used on almost every class of asphalt work and reduce the need for operators to make manual adjustment to match the level of adjoining surfaces.

### Levelling Beam

The levelling beam assists in improving ride quality by averaging surface variations within the length of the beam and by reducing the need for manual intervention of thickness level controls (see Figure 2).

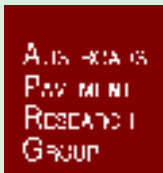
Beams are often made in 3 metre sections. It is generally not practical to use more than three sections (9.0 m) as longer beams become more unwieldy, and flexure of the beam itself results in little additional benefit from the extra length. The simplest, and most common, configuration of levelling beam has a series of spring loaded feet so that the beam adopts an average height.

Levelling beams can be used on most classes of asphalt work and each layer of pavement construction, except where short runs or restricted work areas are involved. As a general guide, levelling beams should be used on all work

*continued on reverse*

### Key Summary

*This issue of 'pavement work tips' describes the selection and use of automated level controls for asphalt paving*



where ride quality is important and where total job length is more than about 200 to 300 metres.

Some of the points to be considered when using levelling beams include:

- Where variations in surface profile within the length of the beam result in significant variation in thickness, or where shape correction is required over longer lengths, a regulation or shape correction layer (or layers) should be placed so that the final layer is substantially uniform in thickness.
- By efficiently filling all hollows in the pavement surface, greater quantities of asphalt may be used. The result is, however, a superior ride quality.
- Equipment must be in good condition. The beam must be parallel with the paver and held firmly upright while maintaining free movement at all connections and levelling feet. Paver levelling systems must also be in good condition and responsive to controls.
- Personnel must be trained in its use. Manual over-riding of level controls should be kept to a minimum. However, it should not be set and forgotten, but kept under observation.
- Good paving practices must be followed, particularly those relating to maintaining smooth forward speed, a constant head of material in front of the paving screed, uniform temperature and smooth changeover of delivery trucks.
- Personnel, including delivery truck drivers must be aware of the beam as a potential hazard and restriction to movement.
- An extra 1.0 m of clearance is required beside the machine to provide safe working space.

### Stringline

Stringlines allow the paver to follow a predetermined level. They are not commonly used on roadworks due to:

- Survey costs in establishing the line
- Severe restrictions on vehicle movement, etc., due to presence of the line, particularly if used on both sides of the paver
- Need for set up for each paver run unless reliance is placed on transferring levels across the pavement using a combination of joint matching and cross-fall control with consequent reduction in accuracy.

### Cross-fall

Cross-fall or slope controls are used to maintain one side of the paver screed tow point constant relative to the other. The reference tow point may be controlled from a joint matcher, levelling beam or stringline. In practice, concern with the reliability and accuracy of cross-fall controls means that they are not commonly used, especially for wearing course work where a small variation in crossfall angle can mean a significant variation in thickness.

### Computerised Electronic Control

Computerised electronic control of pavers requires predetermined thickness and distances to be entered into a computer which then controls paver levels. Accurate survey information is necessary in terms of both level and distance. Paver hydraulic control systems must also be in good condition to ensure accurate response to control inputs.

### SUMMARY

Automatic controls, particularly a combination of levelling beam and joint matcher, result in

superior asphalt level control and finished ride quality with less effort, provided that the requirements for setting up and working with the equipment are understood and accepted.

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

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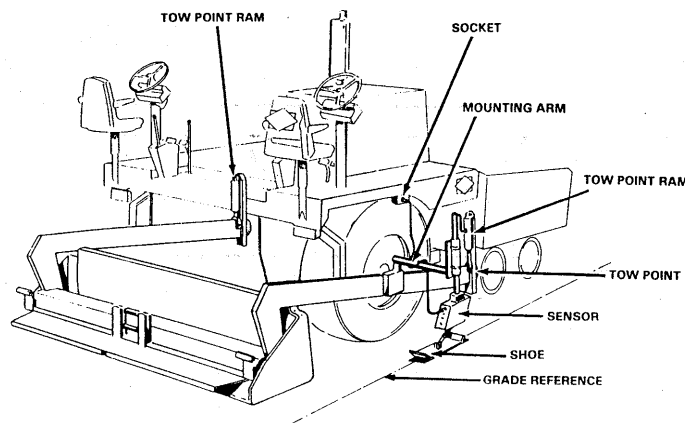


Figure 1: Joint matching

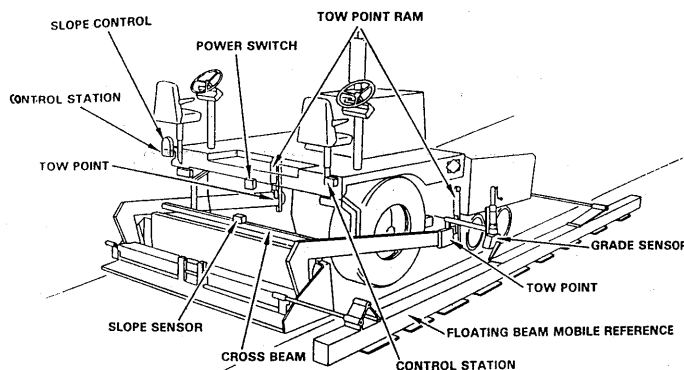


Figure 2: Paver with automatic level control