

The Dustex solution for mining haul roads



THE CHALLENGE

The roads on mines, either above or below, are constructed for haulage purposes or for general ground management purposes. Haul roads are often very wide, have limited drainage, constructed with overburden or discard material and carry very heavy loads. Health and safety issues are considered important factors in most operations (legally enforced) and dust control, usually by water, is widely practised.

The biggest problem on mine roads is visibility, and the need to avoid accidents and at the same time minimise vehicle maintenance and tyre wear, provide a quality ride, optimise health and safety standards, and limit the cost of replacing road gravel.

THE SOLUTION

Using Dustex effectively, you will:

- » Increase road visibility
- » Reduce vehicle maintenance costs
- » Reduce vehicle operating costs (tyre wear)
- » Minimise road maintenance costs
- » Reduce water consumption
- » Lower the equipment requirements
- » Enhance environmental performance
- » Comply with the OSH Act and mining regulations

WHAT IS DUSTEX AND HOW DOES IT WORK?

Dustex is a lignosulphonate – a natural material that is a binding agent for gravel roads and other applications. Dustex is derived from lignin, which is a natural polymer found in wood. Applied to a road, Dustex binds the surface materials, thereby reducing the cost of maintenance and the need for other aggregates to be used. It enhances the visual appearance of the road, improves safety standards and provides a lasting, cost-effective solution to road surface deterioration. Dustex is available in liquid and powder form. It is harmless (non-toxic to humans, plants and animals), easy to use (requires no specialised equipment) and, because it is sourced from trees, it is environmentally friendly and derived from a renewable resource.

Areas to be prepared with Dustex should be protected from drifting sand eroded from untreated zones. Best results are achieved when large, continuous areas are prepared. Consideration should be given to the timing of the treatment (preferably after the rainy season for above ground) and for the best result, Dustex should be applied on a moist surface.

HOW TO USE DUSTEX

It is important to note that the road to be coated with Dustex should be well constructed – built using the best available materials according to correct road construction methods. While application rates and methods can be adapted to suit the particular situation, raw materials should be selected as per the guidelines (below).

SURFACE HAUL ROADS

The performance-related material guideline for southern Africa is recommended for Dustex applications, where high riding quality, year-round passability and low maintenance are required (see table under Material selection guidelines). The guideline provides a dust-free, unsealed road with high riding quality and minimum maintenance. It is not material-type specific since the performance of Dustex is not affected by the chemistry of the soil, but by its mechanical properties.

UNDERGROUND HAUL ROADS

The guideline for underground haul roads is less stringent since these roads are generally unaffected by climatic factors (rainfall, and temperature / humidity fluctuations) and are usually level and supported by bed-rock. The interim material guideline (table) is thus recommended:

Material selection guidelines for unsealed roads:

Characteristic	Guideline		
	Rural	Urban	Haul
Maximum size	37.5mm	37.5mm	75 – 100mm
Oversize index	≤ 5 %	0	≤ 10%
Shrinkage product*	50 – 400	50 – 400	50 – 400
Grade coefficient**	16 – 34	16 – 34	16 – 34
CBR***	≥15	≥ 15	≥40
Hardness****	20 – 65	20 – 65	20 – 65

* linear shrinkage x % passing on 0.425mm sieve

** (% passing 26.5mm - % passing 2.0mm) x % passing 4.75mm/100

*** California bearing ratio - soaked at >95% Mod AASHTO

**** Treton impact value

The nature of materials used to build the road, together with the quality of construction, will determine how well Dustex will perform and what doses need to be applied. In some cases we may need to perform soil indicator and other tests.

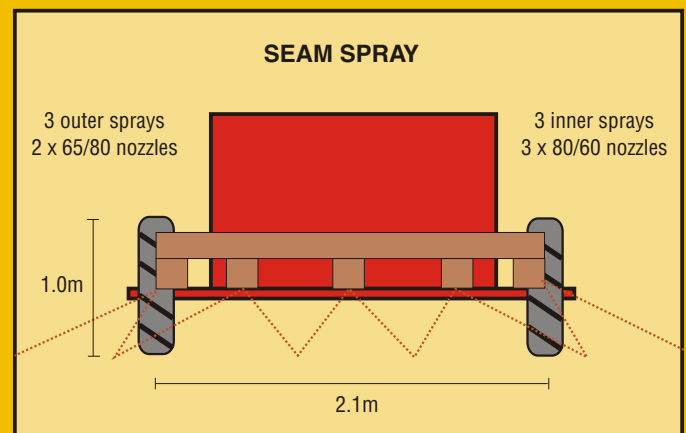
ECONOMIC ANALYSIS

Road performance prediction models provide an indication of the potential savings of using Dustex. Typically:

- Gravel loss – multiply current rate of gravel loss by 0.5
- Blading frequency – multiply current blading frequency by the following factors:
 - <7 days – multiply by 12.8 (increase to 90 days)
 - 8-14 days – multiply by 7.1
 - 15-45 days – multiply by 4.0
 - 46-90 days – multiply by 2.0
 - 90-120 days – allow two bladings per annum
 - >120 days – allow one blading per annum

KEY ELEMENTS TO SPRAY ON APPLICATION

The three key issues are dose, speed and concentration. Aim to coat to a depth of 150mm. If you are unable to penetrate the surface, then wet the surface to increase the absorption rate. You may need to add a surfactant. Calculate how much Dustex to use in relation to the absorption rate, in order to maximise penetration and prevent surface run-off. Spray Dustex on with the equipment you have – no specialised equipment is necessary. Ensure that you get an even spray across the entire surface (avoid localised areas on middle or sides). You may need to get spray-on equipment (ask your Dustex agent for details). Be sure to compact the surface with a smooth roller and shape the road to allow for water run-off.



PRODUCT APPLICATION

Dustex can be applied as a spray-on or mix-in treatment. Spray-on treatments should be used for haul applications or where continuous dust control is required because of high ambient dust levels (especially those found on mine haul roads), since haul roads cannot normally be decommissioned to allow mix-in application. Mix-in treatments can be used in other instances. For mix-in treatments, two-thirds of the product should be mixed with the road gravel. The remaining product should be sprayed onto the compacted surface. An indicative inclusion rate may be calculated by:

$$\begin{aligned} \text{Dustex solid dose (kg/m}^2\text{)} &= \text{Density of compacted material (kg/m}^3\text{)} \times \text{depth (m)} \times 0.04 \text{ to } 0.6\% \\ &= 2\,000 \times 0.150 \times 0.005 \\ &= 1.5 \text{ kg/m}^2 \end{aligned}$$

THE IMPORTANCE OF REJUVENATION

To maintain the dust-free qualities of the treated area, it is essential that you run a planned road maintenance programme along with a Dustex rejuvenation schedule. The surface area will wear as a result of vehicle traffic, payload spillages, debris blown onto the road and other related causes. Dust on the treated area does not necessarily indicate that Dustex has been washed away – it may simply be the result of spillages.

How often should you rejuvenate?

Rejuvenate when the dust level reaches an unacceptably high level. Additional rejuvenation may be necessary in dry seasons or after heavy, sustained bouts of rain. Rejuvenation should be done using between 50-80g per square metre of rejuvenation area, but can vary considerably and should thus be assessed by a Dustex agent. Rejuvenation maintains your dust-free environment, prolongs the lifespan of the area, preserves the wearing course of road in the broadacre environment and enhances the working environment for people in the area. Regular Dustex rejuvenation 'builds up' the performance characteristics of the treated surface, thus distributing the cost of Dustex over a series of treatments.