



## ABSTRACT

**Paper title:** Ultra-heavy Axle Loads: Design and Management Strategies for Mine Pavements

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### Abstract:

The drive for greater cost efficiencies in surface mining has led to the development of ultra-heavy off-highway trucks currently capable of hauling payloads of 345 tons. Typical axle loads in excess of 400 tons are applied to unpaved mine haul roads that have historically been designed empirically, relying heavily on local experience. In the absence of a formal haul road design methodology, good roads *eventually* result – but the learning curve is steep & slow. This approach does not lend itself to an understanding of the road design process and more importantly, if the haul road performance is sub-standard, does not easily allow the underlying cause of the poor performance to be identified. With the trend in increasing truck size, haul road performance has become unpredictable, difficult to manage and costs of both maintaining the road and operating the truck have also increased prohibitively. Most surface mine operators agree good roads are desirable, but find it difficult to translate this requirement into an effective and responsive road design and maintenance management system.

To meet this need, an integrated approach to pavement system geometric, structural, functional and maintenance design components was developed, taking into account road construction costs, vehicle operating costs and road maintenance costs. Since mine roads are built and operated by private companies, minimisation of total transportation costs is required. This paper presents an integrated mine haul road design and management strategy and illustrates the value of its application through several application case studies. A mechanistic approach to structural design resulted in a 29% saving in construction costs and also provided better service, whilst the optimal selection and management of wearing-course materials also provided better functionality at lower total transportation cost. Environmental considerations were addressed by the characterisation of wearing course material performance, both from a rolling resistance and fuel consumption perspective and a fugitive dust emission modelling and palliation perspective.