GLOBAL ROAD TECHNOLOGY

Road Friction Analysis and Rolling Resistance

Introduction

Drivers in the Western Downs Regional Council have become familiar with the sight of GRT plant and equipment and the high quality, dust free road network that has developed. This grew out of QGC looking for innovative ways to improve safety on unsealed roads while at the same time delivering cost savings. With these results now established, QGC and GRT have are applying this same commitment to ensuring this road network maintains its high standard of safety of cost effectiveness.

Road Friction Analysis

The first element of this is GRT’s incorporation of road friction analysis into methodology for road design, construction and maintenance. Friction is the reason that vehicles stay on the road; however it is an often-misunderstood concept. Understanding the interaction of tyre and road surface and how this changes in wet and dry conditions is critical.

At GRT we base our road construction and maintenance friction quality control program on fundamental road design principles, as outlined in the design standards of the department of Transport and Main Roads. The friction benchmark (0.35) is based on the Road Planning and Design Manual curve speed sign guidelines where friction demand values are road safety critical.

How do we measure it?

GRT utilizes the same on-road testing process and in-car friction analysis technology used by Police and Road Agencies Australia wide. The equipment (pictured) used is the Vericom VC4000DAQ Accelerometer. This instrument is used to measure the road friction in dry and more critically, in the wet, to determine if they meet the benchmark of 0.35. Testing of road surfaces is now integrated in GRT’s construction and maintenance activities so that proactive steps can be taken to ensure the QGC network continues to perform at a high standard.
An example of our test results (November 2014) is included below. These are reported on and tracked in the GRT’s Road Maintenance System.

![Graph showing friction coefficient over time](image)

The test procedure utilises the sophisticated, portable tri-axis accelerometer attached to the test vehicle and at a speed of 40km/h full brake application stop test is conducted in multiple locations along the road chainage. The test process is conducted using both conventional (lock up) and ABS brake modes. The results were outstanding.

The results show that GRT Polymer Sealed roads perform equal or better than bitumen sealed roads.

**Rolling Resistance**

In addition to data on road friction GRT have also been researching the benefits of polymer sealing roads in terms of delivering reduced rolling resistance. Rolling resistance is the drag effect that road surfaces exert on a moving vehicle, causing it to slow down, to consume more fuel, experience greater wear and tear, and particularly leads to the faster deterioration of tyres. This is a significant cost factor for haulage operations. In fact a Caterpillar Report Published online indicated that a 5% increase in rolling resistance leads to a 10% loss in production and a 35% increase in costs.

Rolling resistance is another factor that can be measured utilising the Vericom VC4000DAQ Accelerometer. An independent company was engaged to analyse GRT Polymer Sealed roads in the QGC network, adjacent unsealed roads plus two bitumen sealed roads – Broadwater Rd and the Moonie Highway. The results are summarised below.
What we see is that GRT treated roads perform from 12% to 32% better than unsealed, granular roads maintained in a traditional way (grading and watering) and actually perform from 2% to 10% better than bitumen sealed roads (including the Moonie Highway). It is also important to note that in the wet, the performance of unsealed roads will deteriorate as the surface conditions pothole or become boggy. GRT Polymer sealed roads maintain the same low rolling resistance results in all weather conditions.

Conclusion

The results of both the friction analysis and the rolling resistance research clearly display that safer travel, cost savings and a smoother ride are being delivered not only for QGC but all roads users on their network of roads.

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