Evaluating the Laboratory Based Polishing Effects on Both Micro and Macro Texture Wavelengths of New Zealand Greywackes in Comparison to Melter Slag

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Skid resistance is the frictional force that is produced between the road surface and vehicle tyres. This friction has a direct impact on a vehicle's ability to manoeuvre and stop safely. Improving skid resistance in high level risk areas is a key target for providing safe pavement surfaces, especially during wet conditions. One of the main factors that has a direct effect on skid resistance is the aggregate type and aggregate texture. In road surface aggregates microtexture and macrotexture are considered as two main texture wavelengths applicable for skid resistance. Repeated traffic loading on the surface will result in the microtexture polishing and macrotexture abrasion resulting in reduced measured skid resistance over time.
In this research, results of laboratory based polishing tests of both micro and macro-texture between two different aggregates, Melter Slag (artificial) and Greywacke (naturally occurring) aggregates, are compared to in-field measured skid resistance performance by the SCRIM device. The research was undertaken to assess the possibility of using Greywacke aggregate instead of Melter Slag in high risk areas which required a high level of skid resistance performance. The Melter slag aggregate is an iron making by-product of a New Zealand (Glenbrook) steel mill from titanomagnetite sands and the Greywacke aggregate was from Wellington. . The coefficient of friction and macroexture of aggregate are measured by using the Dynamic Friction Tester (DFT) and Circular Texture Meter (CTM) devices in the laboratory and by the SCRIM device for in-field surfacing measurement using the same aggregates. It was found that skid resistance of Greywacke aggregate and Melter Slag, which are polished by the Auckland Pavement Polishing Device (APPD), reduce and reach not to dissimilar equilibrium levels. The paper discusses the results of an economic evaluation of the predicted road safety benefits that considers the surfacing life cycle costs that includes transporting Melter Slag from Auckland to Wellington (approx 650kms) in comparison to a locally sourced natural greywacke aggregate.