Laser Profilometery Testing: Ride Quality (Roughness)

High speed laser systems are linked to inertial and spatial systems to assess the ride quality (roughness) of the road or runway as a major input to a pavement management system, for assessment of construction quality, warranty claims and investigation into premature failure. For over 30 years, Pavement Management Services have been providing independent ride quality testing services to major construction companies, State and Local Road Authorities and Toll Operators, in Australia and overseas. Laser based systems are the only systems to meet Austroads and international standards. A minimum of 16 kHz lasers should be used for roughness assessment up to 80 km/hr. Above 80 km/hr, 32 kHz or 64 kHz lasers should be used. Only 64 kHz lasers are sanctioned for texture measurement.

New solutions for your pavement assets

Pavement roughness is generally defined as an expression of irregularities in the pavement surface that adversely affect the ride quality of a vehicle. Roughness is an important pavement characteristic because it affects not only ride quality but also vehicle delay costs, fuel consumption and maintenance costs. The World Bank found road roughness to be a primary factor in the analyses and trade-offs involving road quality vs. user cost (UMTRI, 1998). Roughness is also referred to as “smoothness” although both terms refer to the same pavement qualities.

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More information available at www.pavement.com.au
Ride Quality Testing Systems

For the measurement of ride quality, Pavement Management Services use several systems all of which are compliant with current national and international standards. The system we most commonly use for the measurement of Roughness is the Danish-made Greenwood Laser Profilemeter (GLP). The GLP is a high-speed 3-Dimensional Pavement Profiling System utilising up to 15 Selcom profile sensors, inertial reference systems (gyroscope + 3 accelerometers) and advanced data acquisition. The GLP provides precision profiles and detailed analyses of the pavement surface conditions. The unit has a measuring width of 3.0 m and is classified as a Class 1 profilometer in accordance with the World Bank classification. The operating speed range is from 30 to 100 km/hour.

Roughness Measurement

Road Roughness is an attribute of the road surface which can be derived from either the physical or mathematical transform of the longitudinal road profile of each wheelpath presented in terms of both International Roughness Index (IRI) and NAASRA Roughness Meter Counts (NRM) for the lane.

Roughness can be reported in the following ways:

- Single Track IRIqc - The IRI based on a quarter car (single wheel track) model run over a single longitudinal profile
- IRI or Lane IRIqc - The standard, composite IRI value representing the roughness of a road lane section. It is determined by averaging two individual, Single Track IRIqc values obtained separately in each wheelpath of a lane (at +/- 0.75 metres either side of the lane mid-track)
- Half car
- HATI

Relevant Standards

- Austroads Guidelines
- New South Wales: T187 - Measurement of Ride Quality of Road Pavements by Laser Profiler
- Queensland: Q708B - Road Roughness Survey
- Victoria: 423.05: Ride Quality - Pavement

Key Benefits

- Monitor ride quality deterioration trends
- Before and After Pavement Seal Testing
- Dilapidation Surveys; Pre and Post Construction
- Road Construction Quality Control
- Ensure contract compliance
- Automated data collection, fast and safe
- Surveyed at traffic speed, no Operators on road
- Fully calibrated machines
- Can be combined with video images

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