Reducing health and safety risks on poorly maintained rural roads

Johan Granlund, Vectura Consulting AB, johan.granlund@vectura.se

This paper gives a presentation of several methods to measure pavement damages that bring health and safety risks. These methods can be used in new approaches to reduce risks on low-volume roads. The presentation is followed by a consensus statement on the urgent need to implement such approaches in the Nordic countries. The consensus statement is signed by the Nordic Road Associations (NVF) working group “Vehicles and Transportation”, consisting of 50 recognized experts in the fields of vehicles, transportation and of vehicle-road interaction.

Many professional truck drivers are exposed to human whole-body vibration (WBV) higher than the Action Value in EU directive 2002/44/EC. These drivers suffer unacceptably high risk for work-related musculoskeletal and cardiovascular diseases. Furthermore they are at high risk of being involved in traffic accidents, where also other road users may be severely injured when colliding with the heavy vehicle.

The main cause of ride vibration is road defects. While vehicle suspension systems are engineered to efficiently isolate the chassis from wheel vibration with higher frequencies, they typically tend to amplify vibration frequencies somewhat lower than 4 Hz. Such vibrations are excited from pavement deformation comparable to, or even longer/wider than, vehicle dimensions.

While most previous research have focused on vertical and pitch vibration, recent truck ride measurements on roads in the European Union Northern Periphery (NP) have showed surprisingly high levels of both quasi-static and transient lateral vibration. Unexpected high lateral forces in “egg-shaped” sharp curves and roll-related lateral buffeting is of outermost concern for traffic safety in cold climate, as they may initiate skidding on ice-slippery surfaces. Lateral buffeting also give rise to health issues for vulnerable ambulance car patients.

The EU Roadex III project made comprehensive measurements of pavement condition and of truck ride vibration at 140 km of Rd 331 in Sweden. The tests had three objectives. The first was to assess the daily vibration exposure for drivers of timber logging trucks in the NP area. The second was to use peak vibration values, recorded when driving over bumps, to predict compression stress in the truck drivers’ spine and compare the stress level with limit values in the ISO 2631-5 standard. The third was to validate a new pavement condition parameter, describing undesired variance in cross slope (causing a ride were high vehicles are rolling from side to side), and drafting a relevant limit value for this “roll indicator”.