Empirical Roughness Progression Models of Heavy Duty Rural Pavements

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Abstract : Empirical deterministic models have been developed to predict roughness progression of heavy duty spray sealed pavements for a dataset representing rural arterial roads. The dataset provides a good representation of the relevant network and covers a wide range of operating and environmental conditions. A sample with a large size of historical time series data for many pavement sections has been collected and prepared for use in multilevel regression analysis. The modelling parameters include road roughness as performance parameter and traffic loading, time, initial pavement strength, reactivity level of subgrade soil, climate condition, and condition of drainage system as predictor parameters. The purpose of this paper is to report the approaches adopted for models development and validation. The study presents multilevel models that can account for the correlation among time series data of the same section and to capture the effect of unobserved variables. Study results show that the models fit the data very well. The contribution and significance of relevant influencing factors in predicting roughness progression are presented and explained. The paper concludes that the analysis approach used for developing the models confirmed their accuracy and reliability by well-fitting to the validation data.