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Railway Track Geometry Measurements for Intervention Analysis –Improving the Gold Standard

This paper compares measurements from a regular track measurement car and an onboard measurement system mounted on a regular passenger train car. The measurement systems were compared as an experimental instrument to assess a maintenance action. The experiment involved frequent pre- and post-maintenance measurements from onboard mounted equipment to assess short-term effects, while more long-term effects were assessed through regular measurement train data.

Methodology: the onboard measurement system collected similar track geometry data as the regular measurement car, such as position, speed, and track geometry parameters. The track was segmented into experimental units, with units that had or had not undergone maintenance. The statistical significance of the maintenance effects was analysed using a multivariate ANOVA followed by univariate Welch's two-sample t-tests. Time series analysis is difficult when measurements are collected with irregular intervals. Frequent measurements allow for such modelling, including studying treatment effects over time, such as with intervention analysis and searching for seasonal components. We outline how onboard measurement data could be used for such analyses.

Practical Implications: The paper demonstrates the added value of obtaining frequent track geometry data from regular passenger trains, which can significantly enhance track maintenance strategies and improve railway system robustness, resulting from increased agility of measurements and, therefore, of the maintenance organisation.

Type of presentation

Talk

Classification

Mainly application

Keywords

Experimental design, measurement systems, railway maintenance

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Track Classification: Quality Improvement and Six Sigma