

Contribution to Improving Drivability through the Development of a Quantitative System for NV Sensory Evaluation

**Hiroyuki Kimoto¹⁾ Shunsuke Rikitake²⁾ Masao Yano¹⁾
Yuta Yamakita¹⁾ Kunihiro Nobuhara¹⁾ Hitoshi Yoshimura²⁾**

*1) Advanced Material Engineering Div.
Toyota Motor Corporation*

1200, Mishuku, Susono, Shizuoka, 410-1193 Japan

*2) Under Body Function Design Dept., Lexus Body Engineering Div.
Toyota Motor Corporation*

1-1, Ushiroyamashimogiri, Shimoyamata-shiro-cho, Toyota, Aichi, 444-3222 Japan

KEY WORDS: vibration, noise, and ride comfort, intake and exhaust system/drive line (drivetrain), evaluation technology/measurement technology/sound source search technology, quantitative system (B3)

While NV analysis and evaluation are crucial for improving stability, quietness, and feel, it has been difficult to assess the sensory that do not rely on skilled workers. we assessed the effect of static electricity elimination (antistatic tape) on improving accelerator drivability using our data analysis system (WAVEBASE). Vehicles become electrically charged due to factors such as tire wear-induced delamination (Fig.1) . it was measured vibration of the air cleaner associated with accelerator operation (on/off). The data were preprocessed such as a Fourier transform to eliminate the influence of the time. They were analyzed three types of data with different Electrification (n=2) . As a result, through the evaluation map(Fig.2), the antistatic effect was quantified, on low and high frequency reduction (Fig.3, 4) . Through data analysis, we suggested the potential to clarify the reduction of driving variability, which considering to underpin sensory evaluations, by quantifying the effects of antistatic tape.

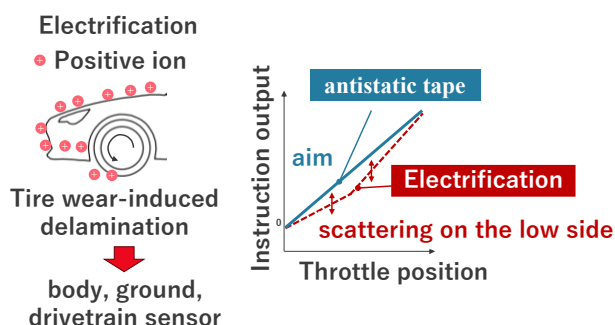


Fig.1 Mechanism by which electrostatic charging destabilizes sensor ground and degrades drivability, and its suppression by the antistatic tape

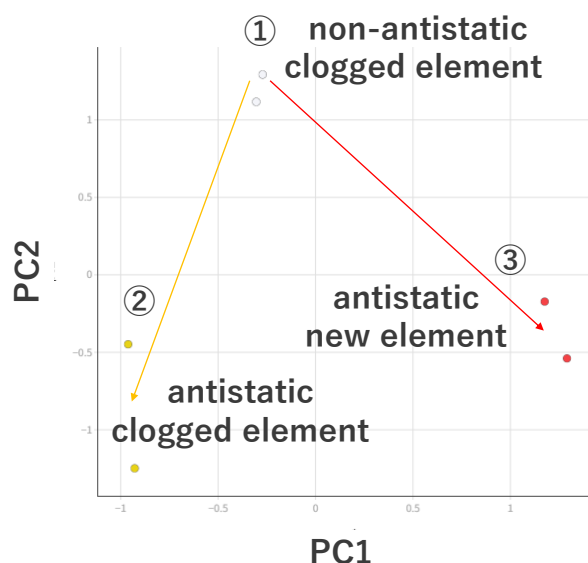


Fig.2 Evaluation map (PC1-PC2 score map) quantifying the antistatic effect

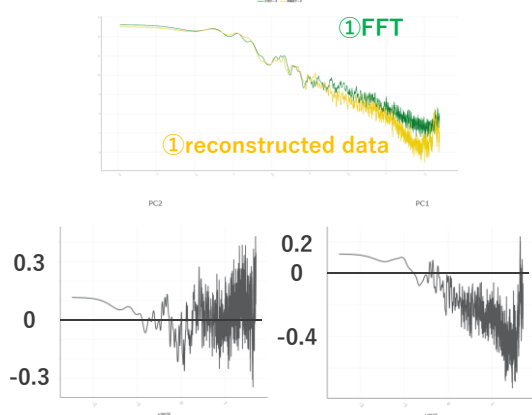


Fig.3 Top : (Green) ①FFT waveform
(Orange) reconstructed data using principal components (PC1=1.5154, PC2=-1.5031)
Bottom : Principal component 1 and 2 waveforms

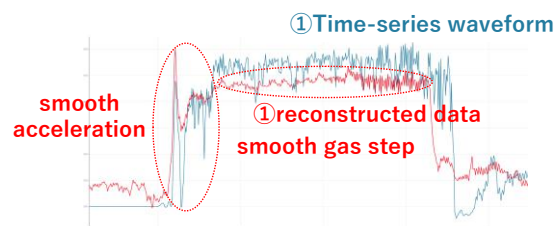


Fig.4 (Blue) ①Time-series waveform
(Red) reconstructed data using principal components