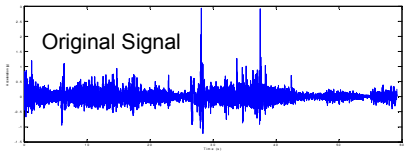
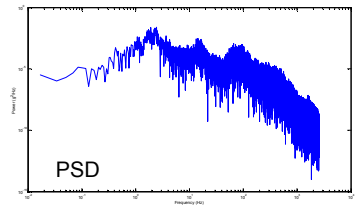
The Centre for Power Transmission and Motion Control

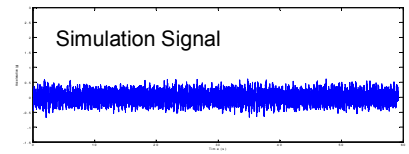
UNIVERSITY OF BATH

Research Project

INVESTIGATING NEW TECHNIQUES IN VIBRATION TESTING AND ANALYSIS







Motivation

Packaging plays a major role in the protection of goods from hazards during distribution. Packaging testing standards exist to ensure adequate protection is given. Part of these standards include simulating transport vibration using PSD. This area has been heavily criticized for its inaccuracies when simulating the transport environment. Confidence could be improved by introducing a more representative simulation method, which in turn would lead to optimal packaging design.

Power Density Spectra (PSD)

A PSD measures the power of a signal at each frequency band. The PSD of a signal can be found by applying Fast Fourier Transforms (FFT's) to the signal, converting the signal to the frequency domain. The PSDs from several signals can be combined to produce an average spectrum which is used in today's standards. A simulation signal can then be produced by inversing the PSD. Unfortunately, this results in an averaged signal, missing the discrete high acceleration peaks that occur in transport vibration due to road damage and hazards.

Improved simulation methods

During this project, several improved simulation methods will be evaluated by measuring the response of a test specimen (wheat biscuits). Ultimately, this will lead to the construction of a new testing regime.

- High and Low Separate spectra: Two PSD's are created, one of which includes only the top percentile of data, allowing for some variation in amplitude
- Shock-on-Random: Measured shocks are added to the test signal, accounting for the discrete shock events
- Varying the Root Mean Square (RMS): Creating a non-stationary signal
- Time History Reproduction – Real time signals are used to create a test signal

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