

Appendix 1. Frequency Analysis of Force Beam Signals

A frequency analysis of the force beam was conducted to ensure that the force signals were not affected by the natural frequency of a low beam (e.g., wheelchair arm-rest/wheel height) and high beam (e.g., overhead grab). A power spectral density estimate was performed using a periodogram of both the low beam and high beam signal for the vibrations following a simple pull and release trial. The natural frequency of the low beam is approximately 25 Hz (**Figure 1**), while that of the high beam is approximately 6 Hz.

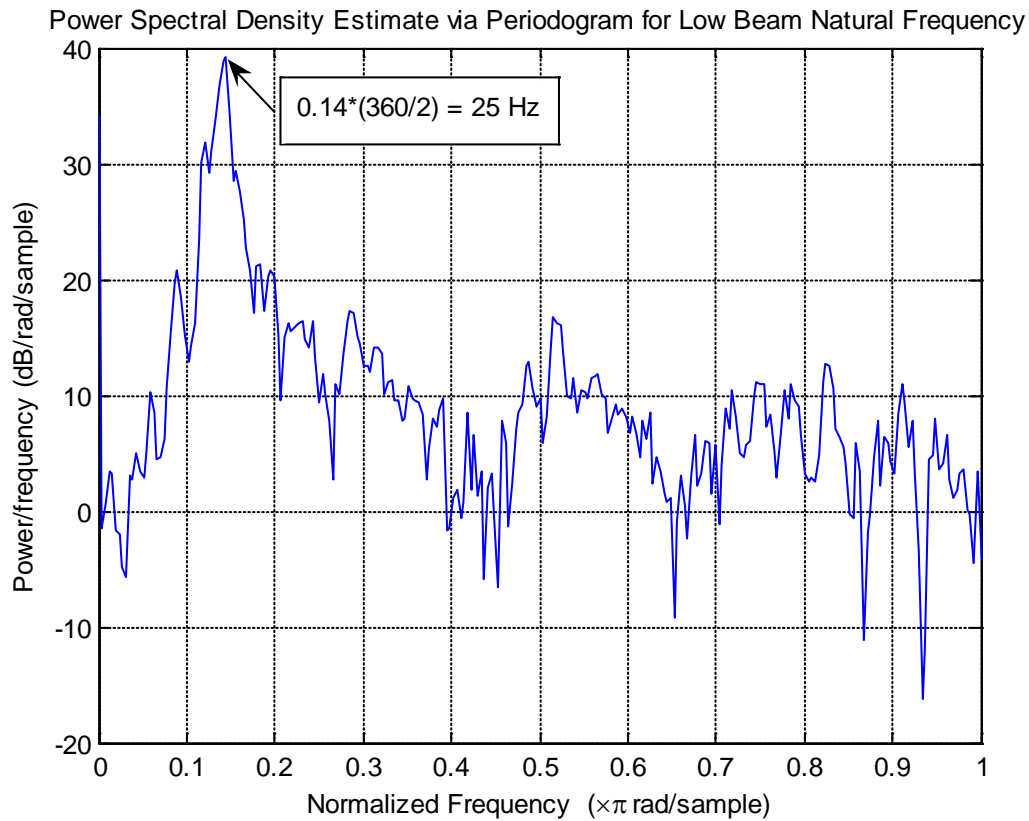


Figure 1. Power Spectral Density Estimate for Natural Frequency of Low Beam

To ensure that frequencies during a transfer were not influenced by the natural frequency of the bar, a power analysis of the overhead transfer was performed. **Figure 2** shows that the frequencies with the highest power are lower than the natural frequency of the overhead beam. To further show that the filter is not cutting out higher frequencies, **Figure 3** shows the raw and filtered data for an overhead transfer. The result is a moving average effect, and overall magnitudes are not affected.

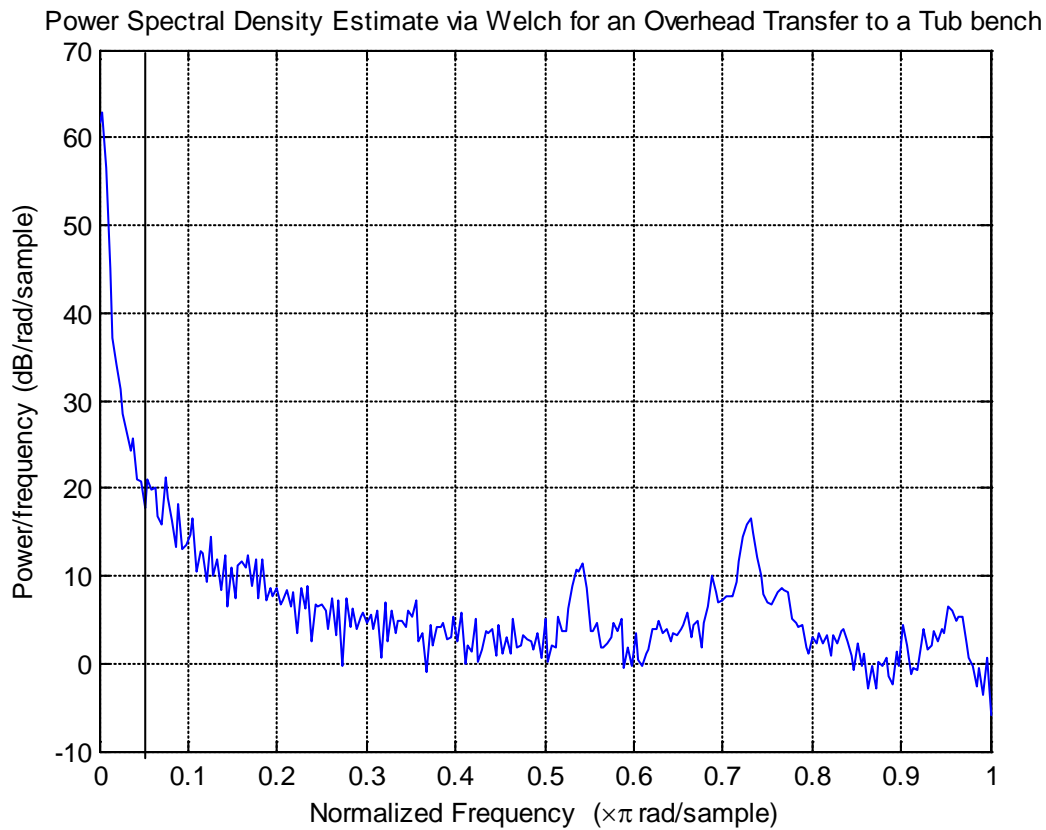


Figure 2. Power Spectral Density Estimate via Welch for an Overhead Transfer to a Tub bench

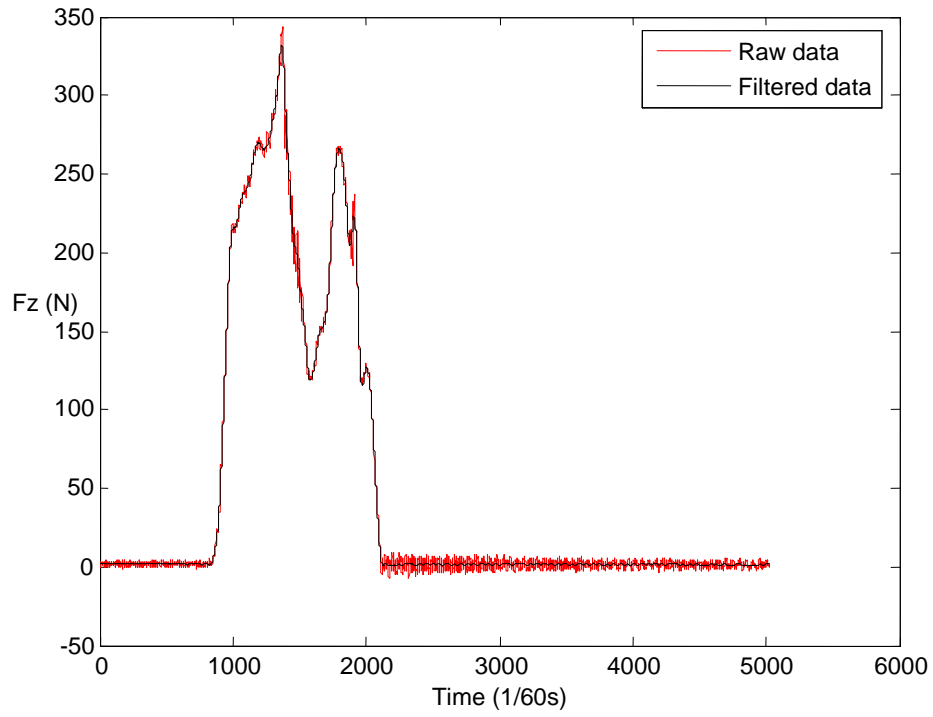


Figure 3. Raw and Filtered (6 Hz cutoff) Force Data for an Overhead Transfer