# Bar Buzz Kill

## Laboratory testing results

**Bar Buzz Kill** tests conducted at the Dynamic Systems Lab, Vibrations Research @ Michigan State University, East Lansing

***Project Description***:

Permawick Corporation approached our Vibrations Research Lab with a request to test a new vibration reduction product (**Bar Buzz Kill**). We accepted the project and with samples supplied by Permawick developed and performed a series of tests on various motorcycle handlebars.

**Test Procedure**:

The experiment was conducted in a quiet/vibration-free environment. The handlebar was suspended at two locations 195 mm from the ends at each side. Accelerometers were located at distances 80 mm and 160 mm from the right end of the rod and the impulse force/impact was given at the center of the handle bar (location where the handle would be connected to the motorcycle).

For verifying the damping characteristics it was decided that a Fast Fourier Transform (FFT) of response of the suspended rod would be taken initially with no **Bar Buzz Kill.** Then additional trials would be run after the product was introduced in the handlebar. We understand and expected that during this test the natural frequency of the handlebar will shift due to the addition of mass.

The experiment was designed to replicate actual vibrations experienced by motorcycle handlebars and document the vibration reduction with the introduction of **Bar Buzz Kill.**

**Bar Buzz Kill** was introduced from both ends of the bar and was filled to a depth approximately equal to the length of the injection hose provided (ten inches). Approximately 25 grams was injected from each end of the handlebar, at total of 50 grams.

6 sets of data were recorded with and without **Bar Buzz Kill** and the results were use for computation and plots.

## Test A

Figure 1 and 2 shows the response of a bar that replicates a generic motorcycle handlebar. The plots shown below are from the response of the left sensor. The amount of input force i.e. impact from the vibration producing hammer is also accounted for. (As can be seen from labeling in Y-axis). Data was sampled at 500 Hz.

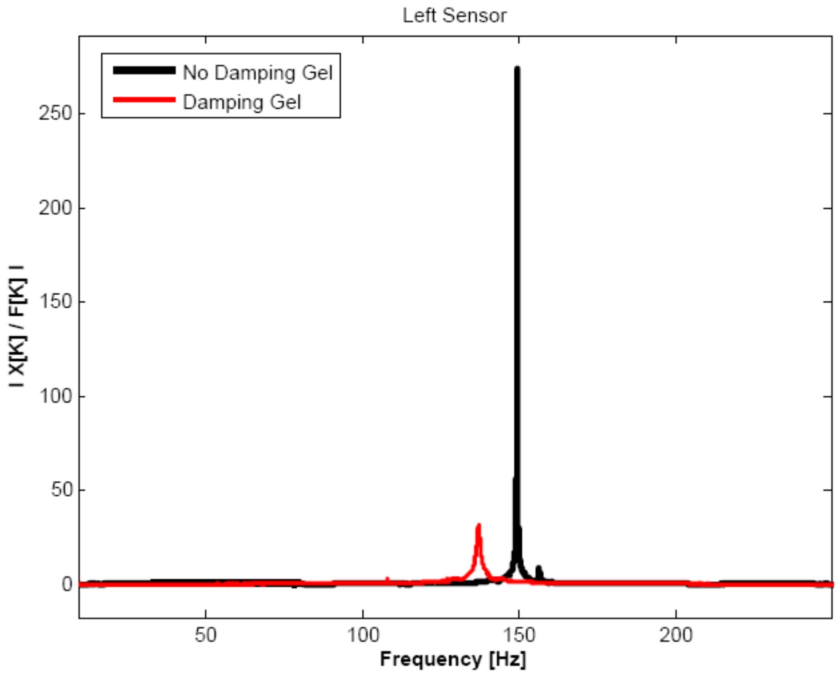


Figure 1: FFT of the response of the Left Sensor (to show vibration reduction)

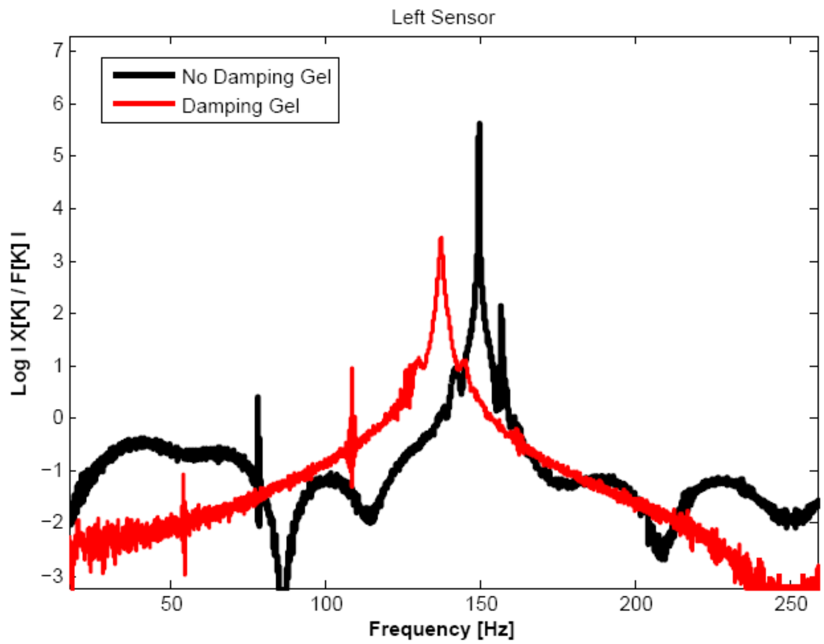


Figure 2: Log plot of the FFT of the response of the Left Sensor *

*Note: The log of amplitude of vibration is shown in order to appreciate the vibration reduction at lower amplitude levels (besides response at natural frequency).

## Conclusions for Test A:

- Use of **Bar Buzz Kill** shows a tremendous reduction in vibration for the generic handlebar.
- The dominant peaks at 150 Hz and 130 Hz which correspond to the same mode of vibration show that the amplitude of vibration reduces by about **8-9 times** with the introduction of **Bar Buzz Kill.**
- **Bar Buzz Kill** also reduces the natural frequency due to the addition of mass as was expected.

## Test B

Figures 3 and 4 below show the response of sensors that were attached to a commercially available handlebar. The graph shows up to 2500 Hz in actual and log scales. Testing was done in two stages. We analyzed multiple frequency ranges to better understand the response of the bar and also to study the effectiveness of **Bar Buzz Kill** for all frequency ranges.

Data was sampled at 5 kHz. Higher range was chosen (as against the 250 Hz in the earlier work) as the handle bar was found to have significant response at frequencies higher than 250 Hz (for eg. at 880 Hz, 1700 Hz approx. etc.).

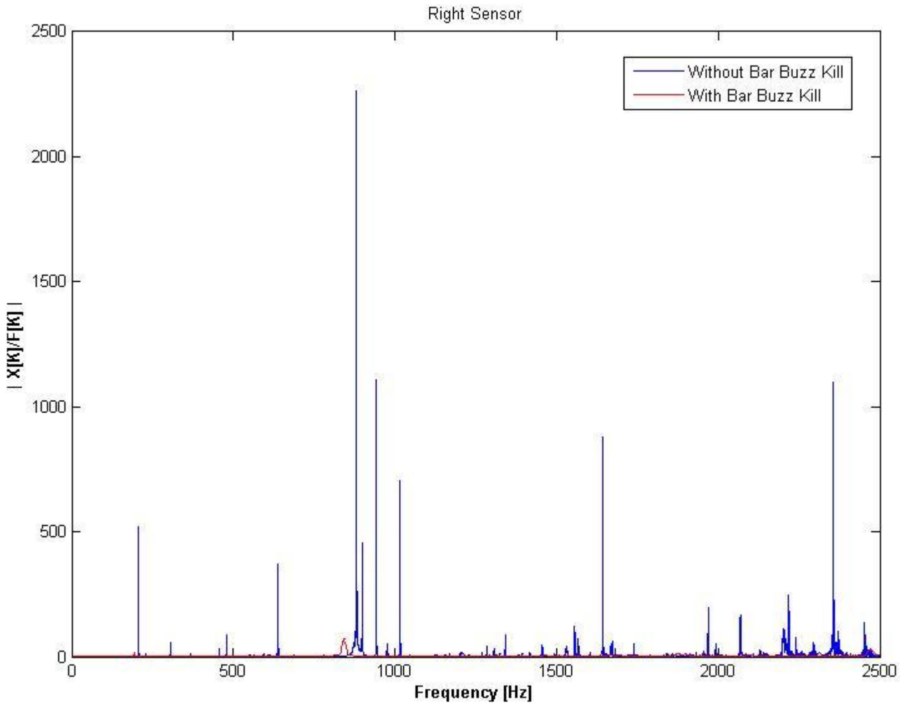


Figure 3: FFT of the response of Right Sensor (shows vibration reduction in handlebar)

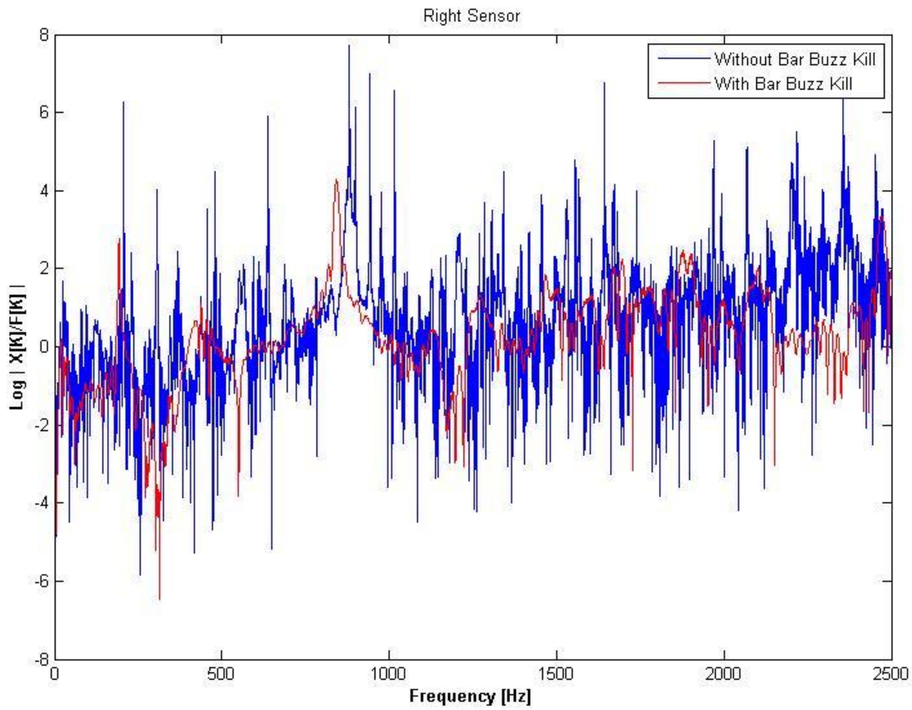


Figure 4: Log plot of the FFT of the response of the Left Sensor *

## Conclusions for Test B:

- Again, the use of **Bar Buzz Kill** shows a tremendous reduction in vibration for a production motorcycle handlebar.
- There are multiple natural frequencies (blue curve) as can be seen in Figure 3. Bar Buzz Kill significantly reduces the vibrations at all frequencies as can be seen from the system response after adding **Bar Buzz Kill** to the handlebars (red curve).

- The affect of having end stops (to simulate handle bar grips) doesn't alter the test results i.e. the Bar Buzz Kill reduces vibrations in this case too.

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