

# Taking the bite out of baseball bats

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Miss hitting the "sweet spot" on a baseball bat and the resulting vibrations can zing your hands. Bat companies have tried for decades to reduce these painful shocks with limited success. But Daniel Russell, a professor in the graduate program in acoustics at Pennsylvania State University in University Park, has figured out that bat vibrations between 600 and 700 hertz (Hz) cause the most pain and that specifically tuned vibration absorbers are the best at combatting the sting. He will present the results of his damping technique comparisons at the 164th meeting of the Acoustical Society of America (ASA), held from Oct. 22 – 26 in Kansas City, Missouri.

Human hands are sensitive to vibration frequencies between 200 Hz and 700 Hz, Russell says. When a ball impacts a baseball bat, two of the resulting bat vibration frequencies fall within that range. Previous damping techniques eliminated oscillations around 200 Hz, which causes pain in whichever hand is lowest on the bat. But after consulting [baseball players](#), Russell learned that the most [painful sensations](#) occur in the top hand, where vibration frequencies between 600 and 700 Hz reside.

High-speed [video analysis](#) showed that these vibrations are so violent, "the hands lose contact with the bat during a swing," says Russell. "The fingers [and thumb] are being flung away from the bat because of the vibration." Foam fillings in an aluminum bat's handle can dampen these vibrations but do not eliminate them. So Russell worked with baseball bat manufacturer Marucci Sports to tune a vibration absorber that cancels out some of these painful oscillations.

The result is a mass-spring device nestled in the baseball bat's knob that quickly eliminates the bending pattern, or vibration, responsible for the bat's more painful sting. These absorbers must be specifically tuned, since the painful vibration frequencies vary depending on a bat's length.

The [vibration](#) absorbers Russell helped calibrate

have been used in commercially available bats since 2010, and so far the response from players and consumers has been very encouraging, he notes.

**More information:** [asa.aip.org/asasearch.html](http://asa.aip.org/asasearch.html)

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