

New devices may cut wheel squeal in public rail systems but do little to reduce rolling noise, research says

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Vibration absorbers are devices used to damp vibration in everything from engines to buildings. When attached to the wheels or the tracks of rail transit systems, they may reduce the noise from trains, bringing more peace and quiet to passengers and those who work or live near the tracks. In tests of two major metropolitan public rail systems, researchers say that vibration absorbers have a modest effect if any on wheel or rail rolling noise, but they may be effective in reducing wheel squeal.

The findings will be presented at the 166th meeting of the Acoustical Society of America (ASA), to be held Dec. 2-6, 2013, in San Francisco, Calif.

The vibration-absorbing devices tested consist of a mass connected to a spring or elastomer, which allows the mass to oscillate back and forth to absorb the energy of vibrations. Rail vibration absorbers are attached directly to the rail. Wheel vibration absorbers tend to be smaller, and several of them are typically placed around the wheels.

Although they have been used in Europe—and have been reported to be effective – they are rare in the U.S., said Jim Nelson of Wilson, Ihrig and Associates, a consulting firm that specializes in issues with acoustics, [noise](#), and vibrations. "My experience is that they have not reduced rolling noise during our tests," said Nelson, who will present some of his team's findings at the conference.

As part of the federally funded Transit Cooperation Research Program, Nelson and his colleagues tested the use of rail and wheel vibration absorbers at the Portland Tri-Met, the light rail transportation system in the Portland area. Researchers also tested wheel vibration absorbers on a heavy rail system. Although the vibration absorbers changed the character of the sound, they did not reduce the rolling noise of the trains at either system, Nelson said. But, he added, it's still too early to draw definitive conclusions.

"I think further testing would be useful," Nelson said. "Vibration absorbers may in fact be quite effective under the right circumstances." For example, tests by various researchers in Europe and tests by Wilson, Ihrig & Associates at the Portland Tri-Met and New Jersey Transit suggest that wheel vibration absorbers can and do control wheel squeal, the high-pitched noise due to the friction between the wheel and rail while the train rounds a curve. Rail vibration absorbers might be able to help control rail corrugation, wave-like wear patterns that form on the rails, which create a rough surface that makes noise when a train runs over it. A reduction of rail corrugation rates would be beneficial in reducing rail grinding costs and would improve rail life. However, rail corrugation rate reduction with rail vibration absorbers has not been proven.

More information: Presentation 3aSAa1, "Noise reduction performance of wheel vibration absorbers," will take place on Wednesday, Dec. 4, 2013, at 8:05 a.m. PST. The abstract describing this work can be found here: asa2013.abstractcentral.com/planner.jsp

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