We have a standard tapping machine. Why not a standard rolling machine?

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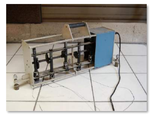
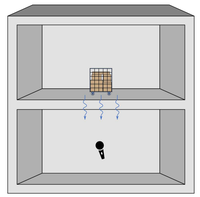
Introduction

- Impact noise is the primary structure-borne noise source regulated in buildings today, using a tapping machine.
- Research is beginning to take place for other structure-borne sources, such as rolling noise.
- Just as the standard tapping machine is used for producing regular impact noise, can a standard rolling machine be created for producing regular rolling noise?

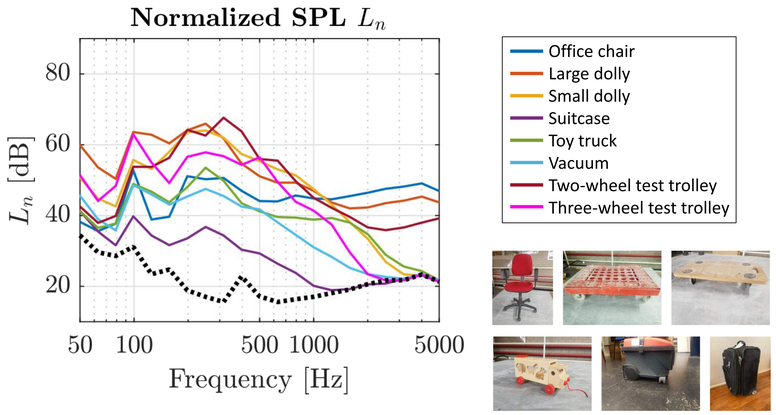


Methodology

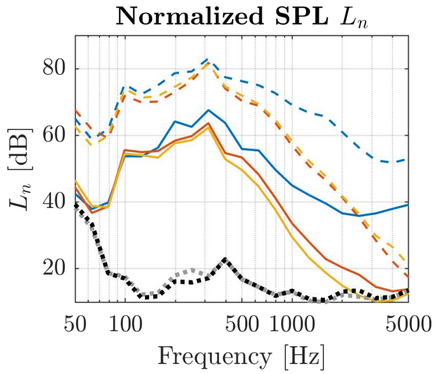
- Measure the noise generated in the reception room below by rolling objects in the emission room above.
- Identify trends in the data and use this information to influence decisions on how a standard rolling machine should be designed

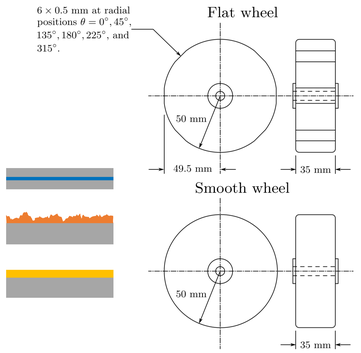


Household rolling items

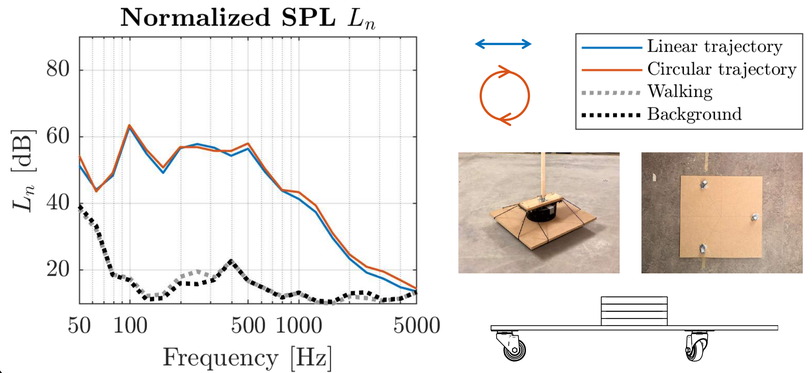


Two-wheel test trolley



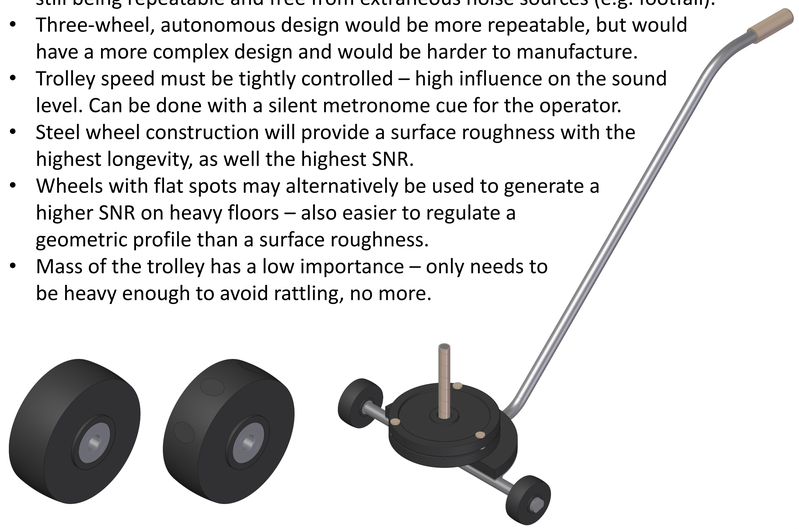


Three-wheel test trolley



Standard rolling machine

- The goal is to reproduce the “worst case scenario” – i.e. make the trolley as loud as possible to ensure a high signal-to-noise ratio (SNR) even on heavy floors.
- Repeatability over accuracy – better to be louder than real-world rolling noise, but actually measurable on heavy floors, than to be true to real-world rolling noise, but too quiet on heavy floors.
- Trajectory has no impact on sound level – decision of whether to use linear or circular may be made based on other design criterion.
- Two-wheel, manually pushed in a linear trajectory yields the simplest design while still being repeatable and free from extraneous noise sources (e.g. footfall).
- Three-wheel, autonomous design would be more repeatable, but would have a more complex design and would be harder to manufacture.
- Trolley speed must be tightly controlled – high influence on the sound level. Can be done with a silent metronome cue for the operator.
- Steel wheel construction will provide a surface roughness with the highest longevity, as well the highest SNR.
- Wheels with flat spots may alternatively be used to generate a higher SNR on heavy floors – also easier to regulate a geometric profile than a surface roughness.
- Mass of the trolley has a low importance – only needs to be heavy enough to avoid rattling, no more.



Conclusions and future work

- Proposed development of a standard rolling device. Linked to the recently accepted European Committee for Standardization new work item: *Measurement of rolling sound insulation* (CEN / TC 126 / WG 7).
- Such a device should be designed to produce a “worst case scenario” in order to be usable on both lightweight and heavyweight floors.
- Use may spur further research into indoor rolling noise by other laboratories.

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