

UBC Social Ecological Economic Development Studies (SEEDS) Student Report

Measured Noise Levels of Dyson Airblade™ Hand Dryers
in UBC Vancouver-Campus Washrooms

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December 2011

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Summary

There has been a recent study which discusses the sustainability of using paper towels as opposed to hand dryers in washrooms on the UBC Vancouver campus. Dyson Airblade™ hand dryers were found to be the most effective method of hand drying; however, they are known to be quite loud. In this study, noise levels from the Dyson Airblade™ hand dryers were measured in three different washrooms on the UBC Vancouver campus. The measured noise levels were compared with noise levels from several typical hair dryers. It was found that the total A-weighted sound levels were similar for both devices, with levels of approximately 84 dBA. Noise levels were also measured in the occupied hallway outside of one washroom while a Dyson Airblade™ hand dryer was in use and not in use; the dryer increased hallway noise levels by 5 dBA.

Introduction

There has been much discussion on the use of hand dryers versus paper towels in washrooms, in terms of sustainability¹. It was found that the Dyson Airblade™ hand dryers are the most effective hand dryer and are used more consistently when patrons are given a choice between them and paper towels. However, the noise produced by Dyson Airblade™ hand dryers has been expressed as a concern, as they have the potential to be disruptive to washroom conversations as well as to neighbouring offices or workspaces. Here, noise levels of the Dyson Airblade™ hand dryers were measured and compared to a more commonly used noise source: a hair dryer.

Measurements

Measurements were made in three washrooms in three different buildings on the UBC Vancouver campus: Irving K. Barber, Allard Hall (UBC Law) and Mahoney & Sons Public House. A calibrated Rion NA-28 sound level meter was set to measure the equivalent continuous (average) sound level (Leq) in decibels for five seconds. In all three washrooms, noise levels were measured at a typical user's head location while the hand dryer was in operation. In Irving K. Barber, noise levels were also measured in the occupied hallway outside the washroom, with the door closed, when the Dyson Airblade™ hand dryer was and was not in use.

Sound levels of two typical hair dryers were also measured while on and set to 'high'. The sound level meter was placed near the user's head, avoiding the direct stream of air from the dryer.

In order to determine how sound levels varied with frequency, measurements were made in third-octave bands from 16 to 8000 Hz.

Results

The noise levels from the three Dyson Airblade™ hand dryers and the average level from the measured hair dryers are shown in Figure 1. The noise levels of the Dyson Airblade™ hand dryers in the three washrooms were very similar; differences were likely mainly due to the different room environments. Above 1000 Hz, levels were also similar to those of a hair dryer – between 75 and 80 dB. As the frequency decreased below 1000 Hz,

the noise level from the hair dryer dropped off to below 50 dB at frequencies below 100 Hz. The Dyson Airblade™ hand dryers, however, decreased in noise levels only slightly, remaining at 65-70 dB below 100 Hz.

The average total A-weighted noise level measured from the Dyson Airblade™ hand dryers was 84.3 dBA; the level from the hair dryer was only slightly lower at 83.8 dBA. A-weighting accounts for the human ear’s frequency response, which is more sensitive to frequencies near 1000 Hz and very insensitive to low frequency sounds; thus, A-weighted levels indicate what people hear. This suggests that the Dyson Airblade™ hand dryer and a typical blow dryer set on ‘high’ would be perceived by a user to be of equal loudness.

Figure 2 shows the noise levels measured in the occupied hallway outside the washroom in Irving K. Barber while the Dyson Airblade™ hand dryer was on and off. The hallway had a large amount of foot traffic, and across the hallway there were many students studying at tables; therefore, background noise levels were not constant. This can explain the unexpected results at frequencies below 100 Hz, where the ‘in use’ case had lower sound levels than the ‘not in use’ case. On the other hand, at higher frequencies the hand dryer increased noise levels by up to 8 dB. The total A-weighted noise level in the hallway when the Dyson Airblade™ was on was 62.2 dBA, 5 dBA higher than when it was off.

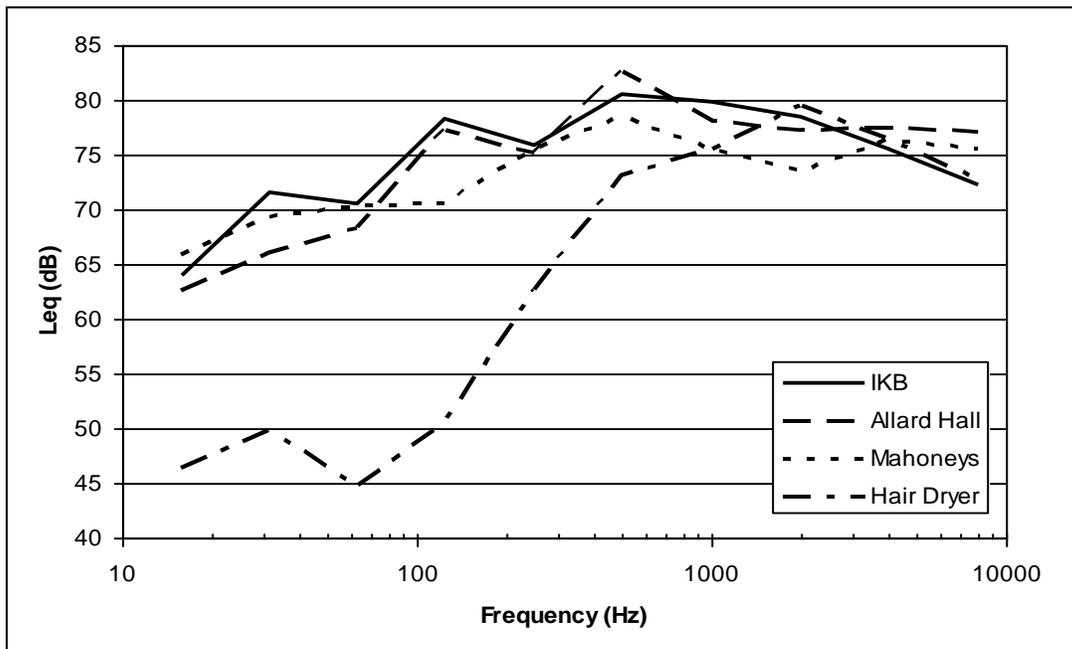


Figure 1: Measured variation with frequency of the average noise levels (Leq) of the Dyson Airblade™ hand dryer taken in Irving K. Barber (IKB), Allard Hall, and Mahoney & Sons, and from a typical hair dryer.

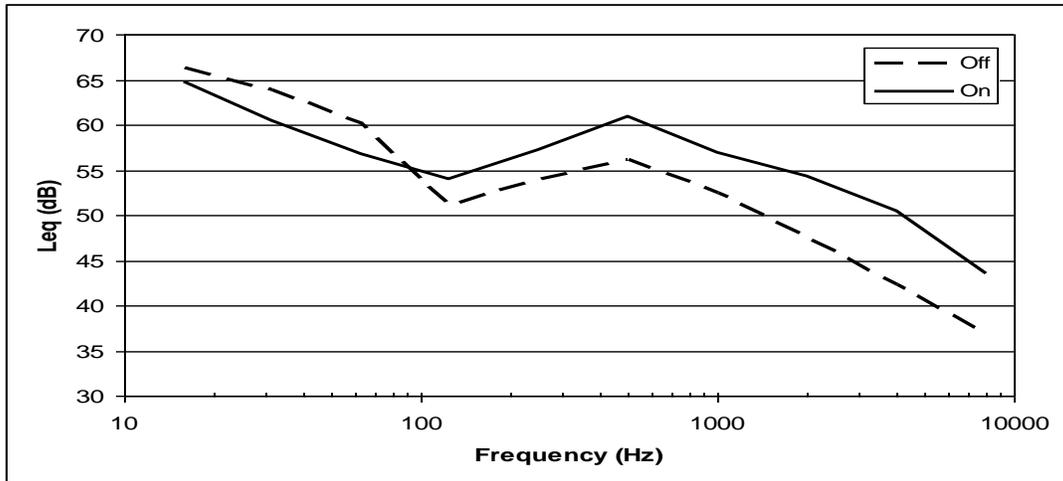


Figure 2: The variation with frequency of average noise levels (Leq) measured in the occupied hallway outside the IKB washroom, when the Dyson Airblade™ hand dryer was on and off.

Discussion and Conclusions

The Dyson Airblade™ hand dryers were found to emit noise levels of about 84 dBA, similar to those of a hair dryer on ‘high’. This result is similar to the results presented by Fullerton et al.², who compared the Dyson Airblade™ hand dryer to other commonly used hand dryers, which had noise levels between 82 and 100 dBA. This level is in the range that can cause permanent hearing loss after long-term exposure. Such noise levels can be disruptive to users, as well as others in and near the washroom. Washroom conversations must be put on hold while a Dyson dryer is running, as voices cannot be heard over it. Students studying nearby, or people working in nearby offices, are subject to an audible increase in noise which could be distracting. In the hallway outside one washroom, a 5 dBA increase in noise (doubling of loudness) would be heard when the Dyson was in use. The majority of the noise increase was at high frequencies, which are often considered to be more irritating to listeners. As this study did not examine other factors of the performance of Dyson hand dryers, it cannot comment on whether other benefits outweigh the negative noise impact.

References

- 1) L. Neville. The Impacts of using the Dyson Airblade™ Hand Dryers versus Paper Towels in UBC Vancouver Campus Washrooms. UBC SEEDS Student Report, 2011.
- 2) J. Fullerton and G. Unger. Noise from energy efficient hand dryers: Is this progress?. Acoustical Society of America Meeting Lay Language Papers, April 2010. [www.acoustics.org/press/159th/fullerton.htm]