

Case Study: Tuned Resonator Silencer

Loud Dust Collector with Tonal Noise

PROJECT DESCRIPTION

Quality Design is a local cabinet manufacturer, who came to us looking for assistance in controlling the noise from their sawdust collection system. They were unable to run the dust collector, as the fan returning air to the shop was extremely loud. Measurements from an initial visit resulted in a sound level varying between 95 and 100 dBA with a very dominant low frequency tone around 125 Hz. The tonal nature of the sound before the installation of the silencer is evident in measurements. Prominent tones are more annoying to an average listener than an equivalent level of broadband noise.

ACOUSTIC ANALYSIS

A narrowband analysis was performed prior to construction in order to fine tune the design of the silencer baffle to match the tonal frequency, and the prominent tone was found to be 35 dB above the broadband noise floor. This indicated that a tuned dissipative silencer would be the most appropriate and effective solution given the constraints involved, such as length available. The silencer was designed based on in-house testing performed in January of 2005. Without the results of the physical test, tuning analysis and silencer optimization would not have been possible.

ENGINEERED SOLUTION

As can be seen from the results, the silencer performed as required by the customer and in accordance with VAW's predictions. The overall sound level from the fan was reduced to 75 dBA with no discernable tones at the blade pass frequency. Before the silencer was installed, a nearby worker could feel the low-frequency airborne sound and would not be able to tolerate being in that environment for long. After the silencer was installed, the plant manager had to check that the fan was actually running.

