

Case Study

Feasible and Effective Noise Control

BY DENNIS P. DRISCOLL

OSHA's proposed reinterpretation of "feasible" noise controls to mean those that are "capable of being done" would require employers to do everything short of going out of business to control noise exposures. One noise source likely to be in OSHA's crosshairs is compressed air. In my 30-plus years' experience in noise control, I've observed that compressed air is typically responsible for at least 30 percent of noise problems in manufacturing plants.

Pneumatic systems, such as air valves, cylinders and/or solenoids, use compressed air to power equipment. These devices generate high noise due to air discharge and/or excessive pressure settings. Compressed air nozzles are commonly used in production tasks, such as ejecting product or parts, moving parts along sorter bowl tracks, evaporative cooling, drying, and closing flaps on corrugated containers. Some hand-held devices, such as air guns, wands, and brooms, also use compressed air. These pneumatic systems and devices can generate noise levels in excess of 100 dBA and are generally the most significant contributors to exposures above the permissible exposure limit (90 dBA).

Problem and Opportunity

Compressed air, in my experience, is the easiest source of excessive noise to remedy and represents the greatest potential for exposure reduction. In addition, companies often see return on their investment in less than a year.

When reducing noise from compressed air, consider the application of the air. Noise generated by air exhaust from air valves, cylinders, and solenoids is caused by turbulence due to mixing of

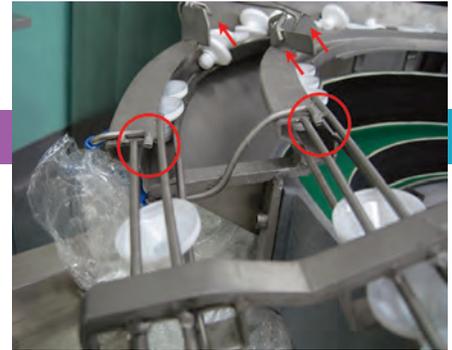
gases with widely differing velocities. In most cases, high-velocity air is exhausted into the stationary air surrounding the equipment. The shearing action that occurs in the mixing regions results in noise radiation, where the intensity of the sound is proportional to the velocity of airflow raised to the eighth power. Therefore, the first step is to reduce the air velocity to the lowest setting needed for the equipment to function properly. This action alone saves money through energy conservation and minimizes wear and tear on the machinery.

If reducing air pressure does not provide enough attenuation, try relocating the discharge point away from typical worker locations.

If reducing air pressure is impractical or does not provide enough attenuation, try relocating the discharge point away from typical worker locations—for example, deep inside a machine's casing or into a manifold where it can be piped away and released in an unoccupied area. Another option is to install a pneumatic silencer. If the air is used to perform a service, as is the case for air guns or wands, quiet-design nozzles are available for retrofit to open-ended air lines or for replacement of standard nozzles. Other practical options are available.

Costs

Attenuation of noise from compressed air has a relatively short-term payback.



Consider a manufacturer that uses a series of vibratory sorter bowls as part of its product assembly process. Each bowl uses five open-ended air lines (such as those indicated in the photo above) to move parts around the tracks within the bowl. The total open area is equivalent to a 10 mm diameter pipe. The air pressure is set to 5 bar (72.5 psig), which results in 185 Nm³/hr passing through the open-ended lines. At an average cost of \$0.015 per 1 Nm³/hr and an estimated use time of 40 percent, this equates to 704 hours of consumption per year. Thus, the annual cost for the open pipe is \$1,953.60 (185 Nm³/hr × \$0.015 × 704 hours).

A Silvent 705 quiet-design nozzle not only reduces the noise level by 20 dBA, it provides the same airflow service at only 95 Nm³/hr for an annual cost of \$1,003.20 per sorter bowl—a savings of \$950 over the open pipe scenario. The Silvent 705 nozzle costs approximately \$200, so the financial payback period for retrofitting five nozzles per bowl is approximately one year.

No-brainer

The use of compressed air systems is by far the primary source of noise in manufacturing plants. Fortunately, noise control for compressed air is relatively easy to accomplish, often saves energy, and yields short-term return on investment. This is a no-brainer, folks. 🙌

Dennis P. Driscoll, PE, is principal consultant at Associates in Acoustics, Inc. He can be reached at (303) 670-9270 or DDriscoll@AssociatesInAcoustics.com.

Send your ideas for Synergist case studies to synergist@aiha.org.