



Strobic Air Corporation

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Eliminating emergency diesel generator exhaust re-entrainment problems at Valley Medical Center

American hospitals are required to maintain – and routinely test – independent power generation systems. Compliance with this rule posed a serious problem at the *Valley Medical Center* in Renton, Washington. Diesel fumes, emitted during the testing procedures, were being reentrained into the hospital's fresh air supply ventilation system.

The VMC campus contains about 1.5 million square feet

Rally Panelo, VMC's director of engineering, recently discussed the steps he took to correct this problem. Panelo is responsible for the operation and maintenance of all the buildings on the VMC campus - a total of about 1,150,000 square feet, including the medical offices and a parking garage. "The main hospital is a three story building of about 470,000 square feet," he said. "Penthouses on the rooftop house the air handlers that ventilate the hospital. If we're running the generator when the wind is coming from the southwest, its exhaust enters the air handlers and eventually the hospital's fresh air ventilation system. We test the emergency generator every month, so if the wind is shifting in the wrong direction, we get the fumes throughout the hospital," Panelo added.

To solve this problem, Panelo's options were to either extend the generator's exhaust stack, which terminates one floor below the penthouses on the third floor rooftop, or move the emergency generator outside the hospital. The design of the stack didn't warrant extending it more than 20 feet, and moving the generator would be costly. A third option brought to Panelo's attention came from Design Air, a mechanical contractor that specializes in HVAC equipment, and Coast Products Inc., a Seattle distributor of air handling equipment. Both organizations suggested a simple solution through the use of a roof exhaust system that operates on the principle of dilution (mixing outside air with plenum air) at a high velocity discharge (up to 6600 fpm) to eliminate these kinds of problems.

The Tri-Stack roof exhaust system, built by Strobic Air Corp., Harleysville, PA operates on a unique principle to enhance exhaust volume by as much as 260% of design flow by mixing outside air with exhaust fumes at the exit of the fan nozzle. According to Pat O'Donnell at Coast Products, VMC installed a ten HP Tri-Stack system on a field fabricated plenum that consisted of heavy gauge expanded metal on all four sides. The emergency generator's exhaust stack was extended into this plenum and pointed towards the Tri-Stack inlet.



Diesel generator exhaust system blends into building architecture.

“Once I saw how this system works, I realized that was the way to go,” Panelo said. He added that VMC decided to put the Tri-Stack on the second floor rooftop so that the exhaust stream would extend at least 20 feet above and clear the air handlers located on the third floor rooftop. “In actuality, the exhaust is dispersed quite a bit higher. And that solved the problem,” he added.

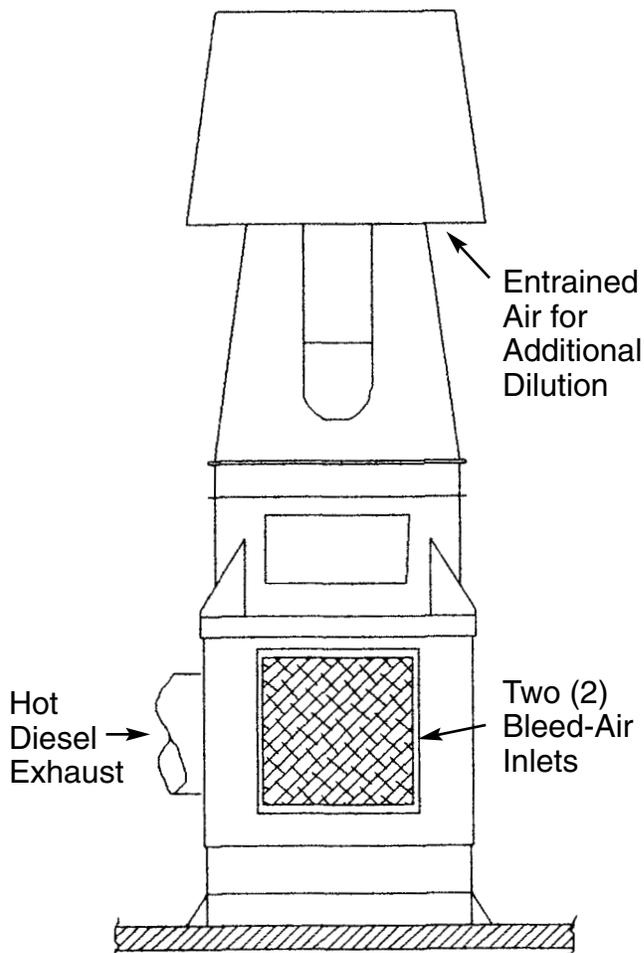
Panelo explained how the Tri-Stack system fits into the hospital’s ducting system. “It’s very simple, really. The Tri-Stack was installed on the roof next to the gen set exhaust pipe. The exhaust pipe was extended and connected to the Tri-Stack system. The Tri-Stack system is set to start simultaneously with generator start up, Panelo said. He added that energy costs to operate the system are “miniscule.”

The Valley Medical Center typically tests its backup generator once a month for an hour or two at a time. When conducting special projects, they may use the generator for much longer periods of time. “When we decided to upgrade our main electrical switch gear, we used our emergency generators and backup system to power the emergency load and ran it for 56 hours without re-entrainment problems,” Panelo added.

Panelo and his staff were so pleased with this solution that they used another Tri-Stack system to resolve another unrelated problem. “About two years ago,” he said, “exhaust fumes from the hospital’s incinerator flue created an odor problem in the area, especially if the wind was coming from the southwest. We decided to put a Tri-Stack system on the incinerator stack which solved that problem.”

Although VMC’s incinerator problem was an odor control issue rather than diesel exhaust re-entrainment, Panelo is conscientious in complying with environmental standards. In fact, the Environmental Protection Agency imposed new, stricter medical waste incinerator regulations which set new limits on nine common air pollutants. These changes will affect more than 2,000 medical facilities throughout the United States.

Tri-Stack roof exhaust systems disperse exhaust without re-entrainment because the exhaust plume is discharged at speeds up to 6,600 feet per minute. Conventional centrifugal fans normally operate at exit velocities of about 3,000 feet per minute. Tri-Stack fans can be economically installed and are virtually maintenance free because they employ no belts, pulleys, motor bearings or springs. Their unique operating principles also reduces system static pressure resulting in substantial energy savings. With a stack height that is typically 60% less than conventional systems. Tri-Stack fans eliminate re-entrainment concerns while operating at noise levels that comply with most environmental standards.



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