M.K. Plastics CORPORATION

Case Study

Market: Medical Center
Application: Diesel Exhaust
Equipment: Axijet-HTS
Case Study #071010

M.K. Plastics Axijet is the solution to the Diesel Exhaust Problem
Anderson Area Medical Center (AnMed)
Anderson, South Carolina

Healthcare's increasing dependence on computers and digital technology is not news to anyone, but the growing size of IT departments within hospitals has a larger impact on the landscape of the campus than one might initially suspect. Facilities strain at the seams to accommodate the additional equipment and instruments, and must often add a dedicated emergency power supply system to keep these essential services operating without interruption.

Architects and engineers planning a new facility naturally have leeway in the placement of various components to make everything work together. Not so when the hospital has been up and running for years - the problem is made much more complicated when the facility is tasked with finding a viable location for a new EPSS in an existing facility. Such was the case at AnMed in Anderson, South Carolina.

Challenged with the project of locating and installing a new emergency power supply system for the center's IT department, AnMed sought the commissioning services of MGI Systems, Inc., and the Healthcare Engineering Network. The design team analyzed the suitability of all possible locations and determined that the best location for the twin 400 kW Caterpillars was a room located in the center of the hospital, and for the paralleling switch gear and twin UPS systems, another room some 30 yards away.

The chosen location for the generators however, posed its own set of challenges: diesel exhausts from the generator room would be situated near fresh air intakes in the main hospital and administration building. The design had to include elements that would ensure that exhaust could never affect the air quality inside the facility.

Two options for dealing with an air quality issue such as this are to extend the exhaust stacks or install 'exhaust fans' to move the exhaust to the height where dispersal would be well above the air intakes. The first option had inherent flaws in that the taller exhaust stacks are associated with back pressure problems. The second option was potentially too costly. AnMed needed an efficient, safe, reliable, low-maintenance solution to this problem.

It was at this early stage of design that M.K. Plastics approached AnMed with the idea of using a high plume, dilution diesel exhaust system. Their patented Axijet design incorporates a specially designed airfoil centrifugal fan with a unique discharge stack that creates a venturi to induce additional airflow into the exhaust stream. That is, the stack design incorporates a constriction that increases the amount and speed of the air flowing through it. This additional air, introduced through a bypass plenum where the fan is mounted, serves two purposes. Mixing the exhaust with ambient air cools the air to a temperature compatible with economical fan construction. The Axijet system meets the goal of energy efficiency by increasing the total air exhaust mass flow, while running a minimum amount of air through the fan.

Secondly, the increased total air exhaust mass provides enough momentum to create a high plume to get the air up and away from the building, preventing re-entrainment, and diluting the effluent – hence the term “high plume dilution” exhaust system.

M.K. Plastics worked closely with the design team to engineer a system customized to AnMed’s set of specifications and proposed application. An initial Axijet selection was made based on the diesels being considered, and the location of the diesel exhaust. The exhaust location would be on top of a roof, adjacent to the second floor of the administration building. An effective plume height of 75 feet was requested by AnMed – to be above the total height of equipment on the administration building.

A budget proposal was presented to AnMed who was impressed with the cost, efficiency, and low maintenance of this solution, compared to other available technologies. Once the design was accepted, a consulting engineer was brought in. The two diesels were selected, each developing 3,400 CFM of exhaust at 1,025 degrees F. High temperature epoxy coated Axijet fans and 304 stainless steel dampers and plenum were specified to resist the corrosive diesel fumes. After some discussion, a redundant, or standby fan was added on a common plenum to ensure reliable operation of the system. The fans included isolation dampers defaulting to the open position. The plenum was specially designed with flanged pipe fittings for the diesel exhaust pipe connection. The bypass plenum also features a bypass control damper to balance the system airflow. The equipment location was confirmed and a 75 foot plume height was specified.

The M.K. Plastics Axijet high plume, dilution diesel exhaust system selection was revised to Model 3000 fans with 20 HP motors and drives. The effective plume height, assuming a10 MPH crosswind, was 75.4 feet.

The Axijet fans were designed to run at constant speed regardless of the number of diesels running, or the load. This ensured the design plume height would be maintained. Furthermore, even though the fans would handle hot exhaust, they were selected and powered for air at standard density to accommodate “cold start” testing.

AnMed purchased the Axijet high plume, dilution diesel exhaust system and received a 5% discount for working with the Healthcare Engineering Network and MGI Systems, Inc. The systems work as designed and to the full satisfaction of AnMed.

Want to learn more about the superior benefits of the Axijet High Plume Dilution System?

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