

# Hybrid Energy Center



## Project Snapshot

### Industry

Power Generation

### Application

Roof Exhaust Fans

### Customer

Dominion Energy  
Shaw Power Group

### Challenge

40-year life expectancy; 128,000 CFM exhaust flow requirement; Quick way to switch between supply and exhaust mode; Low-noise operation

### Solution:

Custom 96' diameter Tu-Way Roof Ventilators from Aerovent

### Result

Customer received long-lasting fans that meet the lifespan, noise and ventilation specifications, and require virtually no maintenance

### **Overview**

In August of 2008, ground was broken on a state-of-the-art Hybrid Power Center in St. Paul, Virginia. Dominion Energy and the Shaw Power Group teamed up to design a 585-megawatt power station fueled by clean-coal and bio-mass. In addition to \$440 million in tax revenues and benefits, this plant would feature a 400-ton Toshiba stator that generated enough electricity to power 146,000 average homes. All the features combined, would make it one of the cleanest power plants ever built.

Aerovent was asked to design a set of the most rugged and efficient roof ventilators for use on the Turbine, Boiler and Coal Bunker Buildings. From design to shipment, Aerovent was able to provide unique solutions for the engineer's needs and all was complete within the 15 weeks necessary to keep the project on schedule.

### **Challenge**

The Turbine, Boiler, and Coal Bunker buildings are massive, steel structures which had separate significant conditions and challenges for this project. Longevity and reliability of the fans, being the most ambitious. Because permits and costs involved in performing maintenance work on the roof of a power plant are considerable, the roof ventilators supplied were required to have a 40 year life expectancy (20 – 30 years above the average lifespan). This meant they had to be engineered and constructed using only the best industrial grade materials and components available.

In addition to lifespan, the fans had to achieve a 128,000 CFM exhaust flow requirement in order to keep the cavernous buildings tolerable for workers during the summer months. In the event of air contamination or another hazard, the power plant needed the ability to quickly reverse the fans in order to supply fresh air into the buildings. In case of a fire emergency, the roof ventilator's dampers needed to be designed to automatically fail in the "open" position to help ensure the safety of the employees and minimize the damage to expensive equipment.

The effect of the noise from several powerful roof ventilators operating at once in large steel buildings and the resultant permanent hearing losses are main health concerns for industrial workers. Because of this, facility engineers had an 85 DBA requirement (at five feet away from the fan). This was to protect the workers hearing over the course of their careers.



96" DIAMETER TU-WAY  
ROOF VENTILATORS WITH 30HP  
PREMIUM-EFFICIENCY  
SEVERE-DUTY MOTORS

Aerovent's advanced engineering and manufacturing capabilities, combined with our high quality industrial products, have made us the ideal solution for the world's most difficult and demanding ventilation challenges. Our impressive 85 year track record is a result of consistently applying our knowledge of fan technology to the individual needs of our customers. This expertise and dedication is what has made us a leading manufacturer of air moving equipment.



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## Solution

Aerovent's solution was to custom build twenty-six 96" diameter Tu-Way roof ventilators, driven by premium-efficient IEEE-841 severe-duty motors. The skin of each fan was made out of Galvaneal, a weldable and paintable galvanized steel, for corrosion resistance. The hood design (also made of Galvaneal) incorporated modular ribbed panels, making it both light-weight and incredibly sturdy. The motors were supplied with cast-iron frames, INPROTM seals and a 2-part epoxy coating, making them some of the most durable on the market. All of these features successfully gave the fans a long life expectancy, as requested.

When it came to achieving the 128,000 CFM requirement, Aerovent was able to meet this challenge because its fan propellers were designed to provide equal airflow in both directions, a feature not commonly offered by other fan companies. While most fan manufacturers only provide a uni-directional exhaust propeller which may produce 40 percent flow when run backwards in the supply mode, Aerovent's fan blades allow for the same amount of airflow in or out. In addition, Aerovent uses a smooth, double-spun housing orifice to increase exhaust/supply efficiency.

The energy center wanted an easy way to switch the fans between supply and exhaust mode. Aerovent worked with the facility engineers to provide an electrical control panel on each fan that links with the central motor control panel. The Aerovent control panel features an onboard combination starter-disconnect switch in a heavy-duty NEMA 4 enclosure. The starter lengthens the life of the motor and the disconnect switch ensures that the unit is powered off during maintenance.

Aerovent's expertise in custom-building fans for complex applications, allowed them to design and construct a special fire damper for the fans. When the motorized damper is activated, a metal linkage arm attached to the damper blades moves to open or close the damper. This fusible linkage arm features a "soft metal" section in the link. When the temperatures reach 212 degrees (as in the case of a fire), the soft metal plate fails, breaking the linkage, and a heavy counter weight swings the damper into the "open" position, allowing smoke to escape.

Lastly, Aerovent responded to the DBA requirement by insulating the main body of the fan (including hoods and plenums) with fiberglass batting then encasing the batting with a perforated galvanized sheet. This drastically reduced the sound power levels produced by each fan. This custom-designed feature is not common to most heavy-duty fans of this type and allowed Aerovent to effortlessly exceed the customer's 85 dBA requirement.

## Summary

Power generation is a complex process. It takes an act of congress (figuratively and literally) to build, operate and maintain a power generation facility. Ventilation equipment should not add to this complexity. Aerovent is one of the only manufacturers with the engineering capability and fabrication resources to accommodate this type of demanding ventilating project. The rugged, high-performance fans Aerovent provided were ideal for the task. Aerovent was chosen for this project because of their reputation for building large custom fans for industrial applications. From design to shipment, all work was performed on schedule with impressive construction and installation, demonstrating their impressive 85 year track record and its position as a leader in the field.