

Project Snapshot

Industry

Power Generation

Application

Roof Exhaust Fans

Customer

Hydro-Québec, Beauharnois
Hydroelectric Power Station

Aerovent Representative

Eric Routhier
Engineer & Partner VDDO Inc.
Delson, Quebec, Canada

Engineering Firm

Dessau

Challenge

Low-noise operation; weight limitation; 25-year projected service life; lightweight, custom, integrated hood

Solution:

Custom VJ fans with hoods
and HD53 fans from Aerovent

Result

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

Hydroelectric Power Station



Overview

The Beauharnois Hydroelectric Power Station on the Saint Lawrence River in Quebec, Canada is one of the largest hydroelectric power plants in the world. Located 25 miles southwest of Montreal, the main building containing the power station is constructed atop the Beauharnois Dam.

Hydro-Quebec, owner and operator of the dam, brought in Dessau, one of Canada's largest engineering-construction firms, to revamp and modernize the power plant which stretches nearly a half mile across the Saint Lawrence River and contains 38 hydroelectric turbines capable of generating up to 1,903 MW of electrical power.

A major part of the Beauharnois Hydroelectric Power Station renovation involved placing the existing ventilation fans, which were installed on the roof of the building in the 1950s. The key was to provide more than twice the existing CFM without adding a significant amount of weight to the structure. The building could not be modified because of its Canadian National Historical Site status. Dessau produced designs and coordinated much of the work, ensuring that the rehabilitation activities had minimal impact on operations; that part of the station continued to function during renovations; and that the integrity of the art deco architecture was preserved.

Dessau turned to VDDO Inc., an Aerovent representative located in Delson, Quebec, to help them meet the fan replacement criteria. VDDO engineers and representatives help clients evaluate and select air movement and air quality equipment such as fans, coils, controls, dampers and diffusers.

Challenge

The structural requirements of the historical building limited the total weight of the fan, which could not exceed 3,800 pounds. In addition to the weight restriction, Hydro-Quebec required the new fans to have a projected service life of 25 years.

Hydro-Quebec also required fans that could be taken off the roof in one piece. Normally, the fan hood would be removed first, followed by the rest of the fan. In this case, Hydro-Quebec wanted to be able to unbolt the fan base plate and remove the entire fan from the roof – with hood attached – in the event a fan needed to be serviced or replaced without spending unnecessary disassembly time.

CASE STUDY



MODEL VJ
DIRECT DRIVE VANEAXIAL FAN



MODEL HD53
DIRECT DRIVE ROOF VENTILATOR

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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The new fans also had to achieve strict noise criteria: 78 dBA at 5 feet. Hydro-Quebec didn't want the new fans generating noise because of the people working in the building. They wanted the fans to be as quiet as possible.

Solution

VDDO supplied 14 model VJ direct-drive, adjustable-blade, vaneaxial fans and four model HD53 direct-drive, hooded, upblast roof ventilation fans – all from Aerovent. The VJ-type fans produce 55,000 CFM, while the much smaller HD53-type fans produce 7,000 CFM.

Standard fan hoods are made of steel, which makes them heavy – too heavy for this application. Aerovent made the custom hoods for this project out of aluminum to reduce the weight. While the weight restriction was 3,800 pounds, the VJ fans weighed only 775 pounds.

Because Hydro-Quebec specified fans that could be taken off the roof in one piece, Aerovent designed the special aluminum hoods to be part of the integral structure of the fan. Not only did the custom hood have to be light, it had to be strong as well.

“The VJ fan is fairly quiet,” said Eric Routhier, engineer and partner at VDDO. “That’s the reason it was chosen. It allowed Hydro-Quebec to meet all the performance criteria – including the low noise level. Plus, the fan blade is adjustable, so if at any point in the future, they need to modify the performance, Hydro-Quebec can adjust the blade angle to fine tune the system and obtain the necessary flow.”

Whereas the adjustable blade feature is standard on the VJ fan, much of what Hydro-Quebec specified required customization. Not only was the integral hood a special item, the fans used a special 20 HP motor to accommodate Hydro-Quebec's 25-year life requirement. These motors are built to the IEEE 841 specification. IEEE-841 identifies the recommended practice for severe duty induction motors in order to enhance their reliability and maintainability.

To ensure longevity of the fans, the fan casings were constructed of hot-dipped galvanized steel. The lubrication and relief lines were customized as well. Instead of copper, Hydro-Quebec specified stainless steel.

Results & Benefits

VDDO and Aerovent provided the right mix of axial fans with the capabilities to meet the desired airflow, noise level and weight requirements. Hydro-Quebec received quiet, long-lasting fans that provide better ventilation than the ones they replaced and require virtually no maintenance other than routine lubrication.

Many of the older turbines are air cooled, and had to more than double the CFM to extract the heat produced by the turbines to maintain the desired building temperature.

Upon seeing the requirements, Aerovent quickly knew they were able to meet them. “We represent many different fan lines,” Routhier said. “But with all the changes and customizations, we couldn't have done this project without the help of the people at Aerovent. They made it happen; in my book, they did what needed to be done.”

According to Routhier, Hydro-Quebec has started work on a similar building 60 miles away. The company must be pleased with the solutions that VDDO and Aerovent provided because they are including the same types of fans in the specification – definitely a good investment.