



## Wind Tunnels

### Project Snapshot

#### Application

Wind Tunnels for  
University Engineering Lab

#### Customer

University of Windsor

#### Location

Windsor, Ontario, Canada

#### Aerovent Representative

Larry Mills, PEng, Sales Engineer  
Ironross Price Sales  
Sarnia, Ontario, Canada

#### Contractors

Aldon Sheet Metal  
Windsor, Ontario, Canada  
  
Industrial Metal Fabricators,  
Chatham, Ontario, Canada

#### Challenge

Provide fans with high,  
streamlined airflow at low static  
pressures and adjustable pitch  
blades

#### Solution

Direct drive and belt driven Type  
VW vaneaxial fans from Aerovent

#### Result

University of Windsor received  
wind tunnels with high quality  
vaneaxial fans that provide  
abundant streamlined airflow,  
efficiency, reliability and increased  
performance that exceeds  
expectations.



### Overview

The University of Windsor in Ontario, Canada installed two new wind tunnels in its recently constructed Ed Lumley Centre for Engineering Innovation. The large tunnel, made by Aldon Sheet Metal, Windsor, Ontario, is more than 57 feet long. The small tunnel, made by Industrial Metal Fabricators, Chatham, Ontario, is nearly 40 feet long. The test areas of both wind tunnels are oriented horizontally. However, the small tunnel operates within a closed loop, which has vertically oriented sections.

Wind tunnels are used in many types of research to study the effects of air moving past solid objects. Dr. Shaohong Cheng, associate professor, Department of Civil and Environmental Engineering at the university, is responsible for the large tunnel. According to Dr. Cheng, this tunnel will be used to study wind-induced environmental, automotive, and structural issues. Both tunnels will help engineering researchers develop renewable energy sources, improve automotive efficiency, reduce air pollution and design sustainable infrastructure.

Although the university brought in two different contractors, both Industrial Metal Fabricators and Aldon Sheet metal insisted on working with Larry Mills, sales engineer at Ironross Price Sales, an Aerovent representative located in Sarnia, Ontario. “Both contracting firms know me and my company well,” said Mills. “Both firms had experience with Aerovent fans over the years, and both wanted to use them for these projects.”

### Challenge

Typically, wind tunnels require relatively high airflow at relatively low static pressures. The University of Windsor’s two new wind tunnels are no different. In addition, the tunnels required streamlined airflow as well as a way to change the flow and pressure characteristics on location if necessary.

The actual size of the fan for the large tunnel was the main challenge. “The large amount of airflow within a small room requires special consideration,” Mills said. “The wind tunnel is a major machine. It’s critical to communicate the importance of room design as well as proper safety procedures.”

The university wanted the fan motor for the large tunnel to be a direct drive unit, and the fan motor for the small tunnel to be belt driven. The small wind tunnel presented a specific challenge because the university wanted it to duplicate an existing tunnel. However, there were no nameplates on the equipment; therefore determining its parameters and characteristics was difficult, but not impossible.

# CASE STUDY



“I was called in to check the existing tunnel to try to determine the airflow,” Mills said. “Without a nameplate, no one seemed to know the tunnel’s rating. I worked with the university to come up with an estimate of what it would do.”

Fortunately, based on the company’s experience in calculating airflow, Industrial Metal Fabricators was able to establish a mock-up, which helped with the tunnel’s performance estimate. “We collaborated on a redesign of the ductwork to make the new small tunnel a little more streamlined,” said Mills.

## Solution

Ironross Price Sales provided two Type VW vaneaxial fans, both from Aerovent. The 60-inch, 60-HP, 1,180 RPM fan for the large wind tunnel is a direct drive unit capable of supplying up to 110,000 CFM and up to 0.7 inch static pressure. The 48-inch, 30-HP, 1,322 RPM fan for the small tunnel is a belt-driven unit capable of supplying more than 40,000 CFM and up to 2.75 inches static pressure. Fan motor speed for both tunnels is controlled through variable frequency drives. If it becomes necessary to change the flow and pressure characteristics of either tunnel, both fans are equipped with adjustable-pitch blades.

Streamlined flow is a primary wind tunnel requirement. “A vaneaxial fan should be used when the application requires high air flow and low pressure,” said Mills. “So the Aerovent Type VW was the right fan for this job.”

The Aerovent vaneaxial propeller is specially designed to work with guide vanes. The overall mechanical efficiency of vaneaxial fans is typically higher than other axial flow fans. The guide vanes improve efficiency and pressure characteristics by converting rotational energy at the propeller discharge into useful work.

## Results and Benefits

Aldon Sheet Metal, Industrial Metal Fabricators, and the university wanted to use Aerovent fans because of their high quality and reliability, according to Mills. “Aerovent is very well known for vaneaxial fans,” he said.

When the small tunnel was commissioned, feedback from Industrial Metal Fabricators indicated that the fan ran smoothly throughout the motor’s frequency range. During proof of performance testing, air velocity reached 7,000 feet per minute (FPM), or 43,750 CFM, which is well above the design rating of 6,000 FPM, or 37,500 CFM. The tunnel it replaced could only attain 4,600 FPM, or 28,750 CFM. At the recommended full speed, the 30 HP motor current is only 18A. The university is very pleased with the fan’s performance because it exceeded their expectations.

Although the size of the large tunnel could potentially limit its use within a relatively small room, steps were taken to emphasize proper and safe operation. Instead of just delivering a high quality fan, Mills took the time to explain the special considerations that accompany equipment of this size and ways to deal with them to get the most from the investment.

Because of the performance, quality, efficiency and reliability of Aerovent’s vaneaxial fans, the University of Windsor’s new wind tunnels will provide engineering professors, researchers and students with improved and expanded testing capabilities.



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