



Quick Facts

Application

Laboratory Fume Exhaust

Customer/Project

Southern Illinois University
Edwardsville, IL

Twin City Fan Representative

Larry Schreiber - Rollie Johnson Inc.
Chesterfield, MO

Engineering Firm

Bric Partnership - Belleville, IL

Challenge

Remove laboratory fumes, provide sufficient plume height, fit heat recovery plenums, provide sufficient airflow, meet noise criteria

Solution

TVIFE Direct Drive, Mixed Flow, Induced Flow exhaust fans from Twin City Fan

Result

Southern Illinois University received fans that remove lab fumes from its Science Building Complex, provide excellent plume height, fit the heat recovery plenums, meet airflow requirements, noise criteria and require very little maintenance

LABORATORY EXHAUST

Overview

Southern Illinois University Edwardsville (SIUE) recently completed construction on its Science Building Complex. The new facility is home to the chemistry, biological science and environmental science departments. In addition to space for classrooms and student/faculty research areas, SIUE's new building includes state-of-the-art laboratories. And where there are laboratories, there must be lab fume exhaust systems.

SIUE included Rollie Johnson Inc. (RJI), a Twin City Fan representative based in Chesterfield, Mo., in the bidding process to provide lab exhaust fans for the Science Building Complex. RJI worked with Bric Partnership, Belleville, IL, to assist with the mechanical and HVAC design and help prepare the proposal, which had to satisfy the performance schedule for the project.

Because SIUE is under the authority of the state of Illinois, capital improvement projects must be approved by the state's Capital Development Board (CDB). The CDB oversees the construction of new state facilities, including college and university buildings. Bric's familiarity with the state's CDB process helped RJI and Twin City Fan meet the design requirements. "We had to design around the performance schedule for the lab exhaust fans," said Larry Schreiber, sales engineer at RJI. "We had to select equipment and provide performance submittals to verify it would work and work well. Actually, the proposal was approved quickly. RJI and Bric also work with a supplier of heat recovery units. The heat recovery units actually form a plenum upon which the lab exhaust fans must sit.

Challenge

With two floors of chemistry, biology, and environmental science labs, the Science Building Complex required ventilation fans that could remove fumes from all labs that could be in operation simultaneously, provide sufficient plume height, accurately interface with the heat recovery plenums and provide sufficient airflow.



CASE STUDY

Standard TVIFE Features

- 125 mph wind-load rating (without the need for guy wires)
- C-Face motor
- Stainless steel hardware
- Heavy-duty curb cap
- Bolted access door
- Housing drain

Model TVIFE Direct Drive Induced Flow Mixed Flow Exhaust Fan



Wheel Sizes
12.25" to 6"

Performance
Airflow to 71,000 CFM
Static pressure to 8" w.g.

Optional TVIFE Features

- Modular Mixing Plenum Box
- Bypass Dampers
- Isolation Dampers
- AMCA spark resistant construction
- Actuators
- Special coatings
- Special materials
- Acoustic attenuated windbands
- Heavy gauge roof curbs
- Jib cranes

In addition, the specification required that fans must be:

- Constant flow
- Direct drive
- Mixed flow
- Within the sound/noise criteria
- Coated with a weather-resistant finish
- Designed into a system that provides redundancy

Because it's a U.S. Environmental Protection Agency requirement, plume height was the first priority. "The lab air must be exhausted at a certain altitude above the buildings in the surrounding area," Schreiber said. "It must be exhausted into the atmosphere safely without contaminating the air intakes of the other Complexes."

However, plume height wasn't the biggest challenge. "Our biggest challenge was fitting the fans on top of the heat recovery plenum units," said Schreiber. "The engineers gave us certain dimensions, which we were required to use, so we had to design within that criteria."

Solution

RJI supplied six TVIFE direct drive, mixed flow, induced flow exhaust fans – all from Twin City Fan. There are two sets of three fans (two triple-plenum units) that tie into two ductwork chases – one for each floor. "However, only two of the three fans on each plenum unit are working at any given time," Schreiber said. "We designed redundancy into the system. In the unlikely event that one fan fails, the other one kicks in at a constant flow."

Each 40 HP 49-inch fan can supply up to 27,500 CFM. Fan speed is controlled by variable frequency drives that communicate with the Building Automation System, which also maintains lab and critical-space exhaust system static pressure, stages fans at predetermined usage periods, and monitors critical system parameters.

The lab exhaust air must be diluted with entrained outside air at a sufficient ratio to ensure environmental safety. The Twin City Fan TVIFE Mixed Flow, Induced Flow fans combine the benefits of axial flow and centrifugal flow fans with the added benefit of entraining ambient air for a pre-diluted exhaust plume. These fans dilute contaminated air at the outlet as well as increase the outlet volume of the fan, which accelerates the discharge air, increasing plume height without a tall stack.



Dilution ratio is the ratio of the total fan outlet volume to the lab exhaust volume. In addition to the induced airflow, the TVIFE fan uses bypass air to maintain the dilution ratio. The dilution ratio for this application is 232%, which means that the fans pull in 2.32 times more fresh air than lab exhaust air.

Benefits

RJI and Twin City Fan provided quality industrial fans that supply the required lab exhaust ventilation, exceptional plume height, and the required dilution ratio. The TVIFE fans interfaced properly with the heat recovery plenums and actually exceeded noise expectations with a sound level of 83 dBA at 5 feet from the outlet.

When the fans were started, they provided the proper flow and static pressures. The system was easily balanced according to the engineers' specifications. "We were able to generate a higher plume height than was specified," Schreiber said. "We also came in at a lower decibel level than was scheduled."

The engineers at Bric Partnership were very pleased with the TVIFE fans. "They were happy that the fans were direct drive units," said Schreiber.

The Twin City Fan TVIFE is one of the few lab exhaust fans on the market that's certified to the AMCA 260 standard. This standard determines aerodynamic performance in terms of inlet and outlet airflow rate, pressure developed, power consumption, air density, speed of rotation and efficiency for induced flow fans.

According to Schreiber, the TVIFE fan is competitively priced and its performance is better than expected. Because the direct-drive fan has no belts, it requires less maintenance and offers greater reliability than belted fan assemblies.

"The best part is the TVIFE fan is backed by Twin City Fan – really good products with good construction and high reliability," Schreiber said. "Twin City Fan has a fan for any application you can think of."

Twin City Fan & Blower has the engineering and manufacturing capabilities to accommodate virtually every conceivable application. We have completed thousands of successful installations worldwide and have a proven track record for tackling the most technically complex and unique applications.

We separate ourselves from the competition by offering a greater breadth of products and quickly adapting to the needs of our customers. This is truly a testament to our company philosophy – respond to the needs of the customer, the first time, every time.



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