

Paper Machine Exhaust



Project Snapshot

Industry

Pulp & Paper

Application

Paper Machine Dryer Exhaust Ventilation

Customer

A leading producer of container board, corrugated and consumer packaging paper products

Aerovent Representative

Glenn Tripp
Industrial & Marine Air Products
Powhatan, VA

Challenge

Provide robust paper machine exhaust ventilation; improve design of how exhaust fan interfaces with existing ductwork to provide high reliability and reduce maintenance issues.

Solution

Belt driven TABD tubeaxial fan from Aerovent; improved fan mounting design.

Result

The container board plant has improved paper machine exhaust. The facility received a fan that integrates with its existing ductwork and provides robust performance with very little maintenance. The new fan was designed to fit within the existing ductwork and provide robust performance with very little maintenance.

Overview

Whether making container board or high grade deinked paper, airflow is critical to the manufacturing process. Exhausting the gas from a paper machine requires a high level of detail and engineering. Typically, hoods for a paper machine's drying section are situated within sheet metal enclosures to conserve heat. In most of these facilities, a series of roof-mounted exhaust fans positioned above the dryer section remove the hot, moist and often caustic exhaust from the process.

When paper machine exhaust fans don't operate properly, it's difficult to exhaust these fumes adequately. A leading producer of container board, corrugated, and consumer packaging paper products was dealing with issues associated with removing exhaust from one of its paper machines at a particular facility. After experiencing frequent maintenance issues and persistent bearing failures, the plant decided to pursue a more reliable solution. That's when management at the plant turned to Aerovent representative Glenn Tripp, Industrial & Marine Air Products, Powhatan, VA for help. When it comes to fans, he is one of this facility's "go-to" resources.

Challenge

The hood exhaust system at the container board facility consists of multiple exhaust fans mounted along the roof. The ducts from the paper machine's drying section penetrate the roof vertically, turn 90 degrees, and come to a dead end at the edge of the roof.

The previous design was inadequate by today's standards. Each of the existing 72-inch axial fans was mounted on one side of the 8-foot square horizontal duct section. A 10-foot jack shaft passed through, and protruded from, the opposite



PREVIOUS DESIGN



NEW FAN SOLUTION



side of the duct where a sheave, V-belt and motor provided the necessary rotation for the shaft and fan. There was a flange-type bearing and seal on the drive side of the duct, and two bearings within the fan housing.

When using a shaft of that length, “It starts to bow,” said Tripp. “It’s hard to keep bearings on them. It’s hard to get in for maintenance when the paper machine is running and all that heat and moisture is coming through the exhaust duct. You can’t go in the duct to work on it, so it’s extremely difficult to maintain.

There’s no question that going back to previous design would shorten the life of their exhaust system. “The guys were very frustrated,” Tripp said. “Bearing alignment was very difficult. There were three bearings that had to be kept in direct alignment. Two of the bearings are very close together, but one was 11 feet away.”

If the exhaust system does not operate properly, the steam and heat from the paper machine drying section are not removed and the paper won’t dry. “They need these fans to get the exhaust out of the hoods and keep the moisture out of the building,” Tripp said. “In a paper mill, you don’t want the steam in the building because it gets up to the ceiling, condenses, and drips down on everything: the people, motor control centers, motor starters, the motors and the paper. It’s extremely important to keep all the exhaust fans running. If you can’t keep the fans running, you can’t keep the moisture down in the building.”

Solution

Industrial & Marine Air Products supplied a Model TABD tubeaxial fan from Aerovent. The 72-inch, 15 HP, 900 RPM fan for the paper machine exhaust system is a belt-driven unit capable of supplying up to nearly 60,000 CFM at 0.75 inch static pressure, depending on system design and ductwork configuration. In this application, the fan is rated at 50,000 CFM at 0.50 inch static pressure. “It has to be the right fan for the right application,” said Tripp. “The static pressure is extremely important.”

When designing any type of fan system, the ductwork comes first. “In a closed system such as this one, the ductwork determines the static pressure,” Tripp said. “Before a fan can be selected, the resistance of the system must be known because the fan must overcome that resistance. Then the fan can be selected for the right amount of flow against that static pressure, and it will deliver the required CFM.”



MODEL TABD
BELT DRIVEN TUBEAXIAL FAN

SIZE
12 TO 96 INCHES

PERFORMANCE
AIRFLOW TO 131,900 CFM
STATIC PRESSURE TO 1.5" W.G.

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Tripp had to convince the team at the container board plant that a different approach would work. Tripp proposed:

- Eliminating the trans-duct jack shaft
- Removing the old fan
- Installing the new TABD Aerovent fan where the old fan was removed
- Locating the fan motor on the same side of the duct as the new fan
- Sealing the hole where the bearing protruded on the opposite side of the duct

“We were successful in convincing them that this new design would greatly reduce downtime and labor cost,” said Tripp.

After persuading the managers at the container board facility, Tripp worked with the Aerovent team to ensure the new fan matched the performance of the old fan. Aerovent designed a special belt driven short-case fan to match the ductwork opening height and mount on the existing structure. The new fan is equipped with a 304 stainless steel propeller to inhibit corrosion.

Results & Benefits

Industrial & Marine Air Products supplied a high quality Aerovent tubeaxial fan that reliably removes exhaust from the container board facility. “The TABD is an axial flow fan,” Tripp said. “Axial flow fans deliver a tremendous amount of air for a relatively small amount of money.”

In other words, the Aerovent TABD tubeaxial fan provided the best performance for the money in this application. In addition to robust performance, the plant received a highly reliable industry-leading fan, an up-to-date system design that eliminates the reliability and maintenance issues associated with running a jack shaft through ductwork, and the assurance that the high quality of the container board products it manufactures will be maintained.

“Our customers expect us to select the fan that provides the best performance for the lowest horsepower. Performance and efficiency are very important,” said Tripp.

And the container board facility is happy with the Aerovent fan and Tripp’s design. “They’re thrilled,” Tripp said. “They know they received the best fan performance for the money.”

Working with Aerovent is great because “they are good to work with, they stand by their products, they are flexible, and they do what they say they will do,” he said.