

# Donaldson and Bison® Team Up to Test the Limits of High-Performance Blowers

## The Situation and Opportunity

**S**ome extremely demanding applications really test the limits of high-performance blowers. The testing labs at Donaldson Filtration Solutions pushed the limits of what is possible in a vacuum pressure application challenged by extremely high particulate, high temperature, and high moisture.

Donaldson, a global leader in filtration systems, with \$3.4B in revenue, is known for its innovative and robust solutions for a variety of industry sectors, including aerospace, agriculture, construction, food and beverage, manufacturing, and transportation.

In 2019, Donaldson developed a sampling process to evaluate the life and efficiency of different flat-sheet filter media for their industrial combustion aerosol filtration systems.

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ELLIOTT JORGENSEN, DONALDSON SENIOR ENGINEER

combustion particulate,” explains Elliott Jorgensen, Donaldson senior engineer.

He chose an off-the-shelf Windjammer® brushless DC blower from Bison®. “The Windjammer® is a high-performance and reliable solution, at a reasonable cost. It gave us the ability to precisely control airflow to meet our testing protocols along with outputs for our data logging.”

However, the harsh environment eventually overwhelmed the blower.

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### The Solution

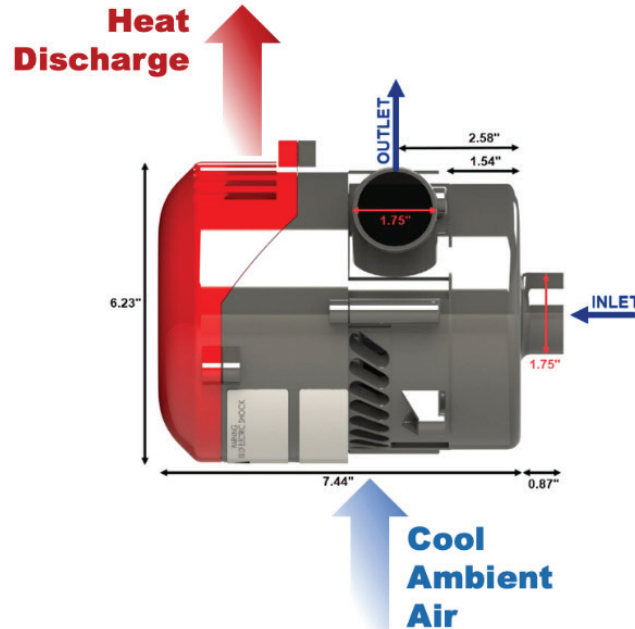
The complete solution necessitated a comprehensive, multifaceted approach, from the overall design of the motor and blower assembly to the materials of the various components to the mounting of the blower housing itself.

Bison® recommended that Donaldson upgrade from a standard Windjammer® 5.7" 2-stage Brushless Blower to the Windjammer® Pro 5.7" 3-stage version, with some options for maximum performance and reliability.

*Better Protection.* Ideally, with electric blowers, the air should be dry, clean, and filtered. In this application, the very wet air causes corrosion in the rotating parts and can wash out the grease that lubricates the bearings.

Therefore, the enhanced system incorporated corrosion-resistant materials and coatings.

- Stainless steel shaft for corrosion resistance
- Sealed bearings specially designed to prevent grease washout and contamination
- Silicone coating of control board for moisture protection



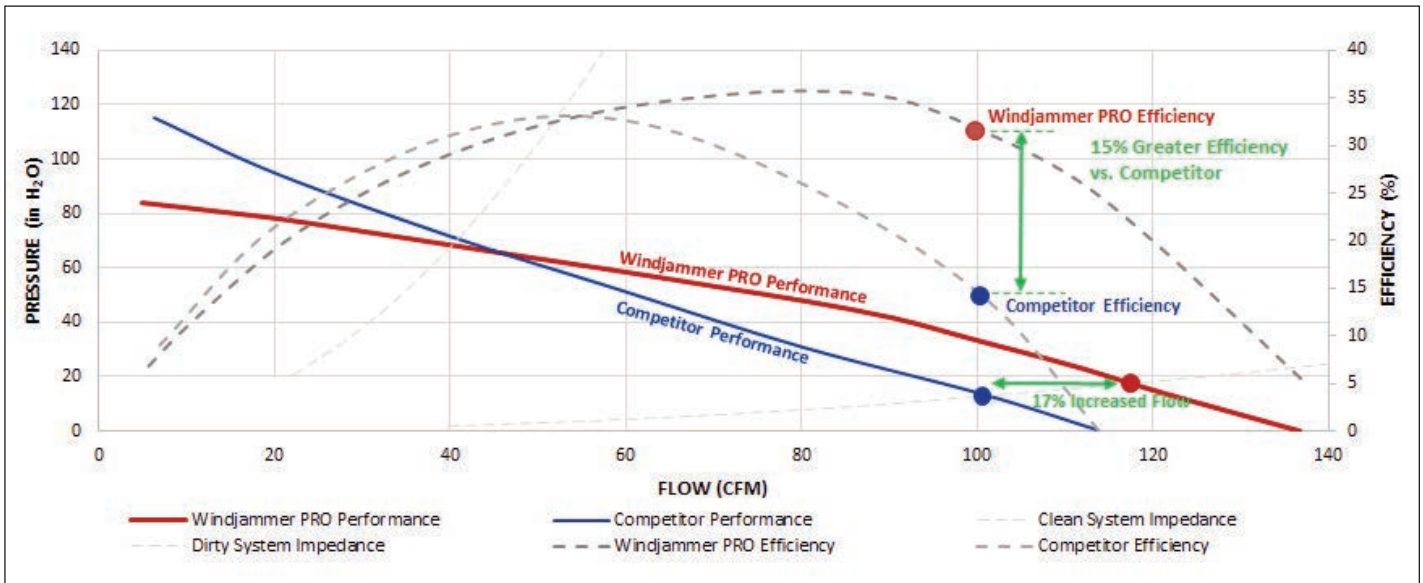
*Higher Performance.* Another important mitigation strategy was the addition of pre-filtering to reduce the moisture and particulate that enters the blower. The pre-filtering significantly increased airflow impedance. Therefore, more vacuum pressure was required, necessitating higher performance of the blower. This was accomplished in two ways.

First, Donaldson upgraded from a 2-stage Windjammer® to a 3-stage version, which provided higher performance.

*Better Cooling.* The other improvement to performance came from upgrading to the Windjammer® Pro to take advantage of the Pro version’s innovative design, which dramatically enhances cooling. Thermal management is the main limiting factor in restricting the performance of electric blowers.

In the development of the Windjammer® Pro, Bison® rethought the whole cooling process, implementing a system architecture called “reverse cooling.” Instead of the traditional design that locates the

**CASE STUDY**



Example data. Not representative of all Windjammer® Pro blowers or Donaldson's application.

cooling air intake next to the hot motor, this new approach uses the fan impeller to draw in cooler ambient air.

Like all bypass blowers, the cooling air is isolated from the air flowing through the blower. But what is special about the reverse cooling in the Windjammer® Pro is that the cool air washes over the electronics board, cooling it, before it is pulled through the motor and discharged.

This improved cooling method results in being able to drive high performance, and the lower temperatures increase the life of the brushless motors.

*Custom Mounting.* All these improvements came from upgrading to the Pro and 3-stage version of the Windjammer® and incorporating special features such as the sealed bearings, stainless steel components, and silicone-coated control board. The collaboration between the Donaldson and Bison®

teams also led to one additional improvement that was external to the blower itself: the mounting system.

The application engineers at Bison® identified that the original mounting method was placing stress on the blower housing, hindering the rotation of the fan impeller. Bison® proposed an alternative mounting configuration, which was fabricated and installed by the Donaldson team, resolving the issue.

**“Donaldson’s ability to build a reliable testing capability has been critical to our business, while Bison’s deep understanding of our demanding requirements has contributed to their ability to design reliable solutions for their customers’ most challenging operating conditions. Together, we have created a mutually beneficial partnership that has paved the way for continuous growth and success.”**



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## Inspiration – What’s Next?

“Our collaboration has proven to be incredibly rewarding for both parties,” says Jorgensen. “Donaldson’s ability to build a reliable testing capability has been critical to our business, while Bison’s deep understanding of our demanding requirements has contributed to their ability to design reliable solutions for their customers’ most challenging operating conditions. Together, we have created a mutually beneficial partnership that has paved the way for continuous growth and success.”

## Results

Jorgensen appreciates Bison’s commitment to Donaldson’s success.



“They even overnighted an upgraded blower to us so that we could keep our testing on track. Their commitment to our success and the reliability of their products enabled us to complete our testing process on schedule, in time to meet the high customer demand for the medias under development.”

“Equally important, the high performance and reliability allow us to

perform high-quality tests, evaluating how well our product can perform when pushed to their limits, under long & uninterrupted test cycles” added Jorgensen.

To learn how you can partner with Bison®, visit [BisonAMETEK.com](https://BisonAMETEK.com) or email [Bison@AMETEK.com](mailto:Bison@AMETEK.com).

