



WHITE PAPER

MAXIMIZING SYSTEM
PERFORMANCE:
**THE VALUE OF CUSTOM
INDUSTRIAL FANS
AND BLOWERS.**



FANS AND BLOWERS ARE ESSENTIAL COMPONENTS IN A WIDE RANGE OF EQUIPMENT AND SYSTEMS.

By custom-designing these integral products, OEMs and engineering firms can gain new flexibility to address specific challenges, meet unique specifications and optimize their equipment and systems around performance, efficiency and cost.

Fan and blower customization can also help OEMs and engineering firms secure a competitive advantage. According to a report on fans and blowers from VMR, environmental concerns have driven a demand for greater fan and blower efficiency. Plus, businesses are actively seeking more reliable and higher-performing solutions. Custom fans and blowers enable new and differentiated system designs that meet these demands, helping OEMs and engineering firms extract maximum benefit from a growing market.

THE SPECTRUM OF CUSTOMIZATION

Industrial fan and blower customization can take many forms. In some cases, a small modification of an off-the-shelf solution might be sufficient. Often, however, the ability to build a fully customized solution from the ground up can have a significant impact on overall process efficiency, long-term operational costs and environmental health and safety. There are three primary levels of customization:

Off-the-Shelf/ Non-Custom

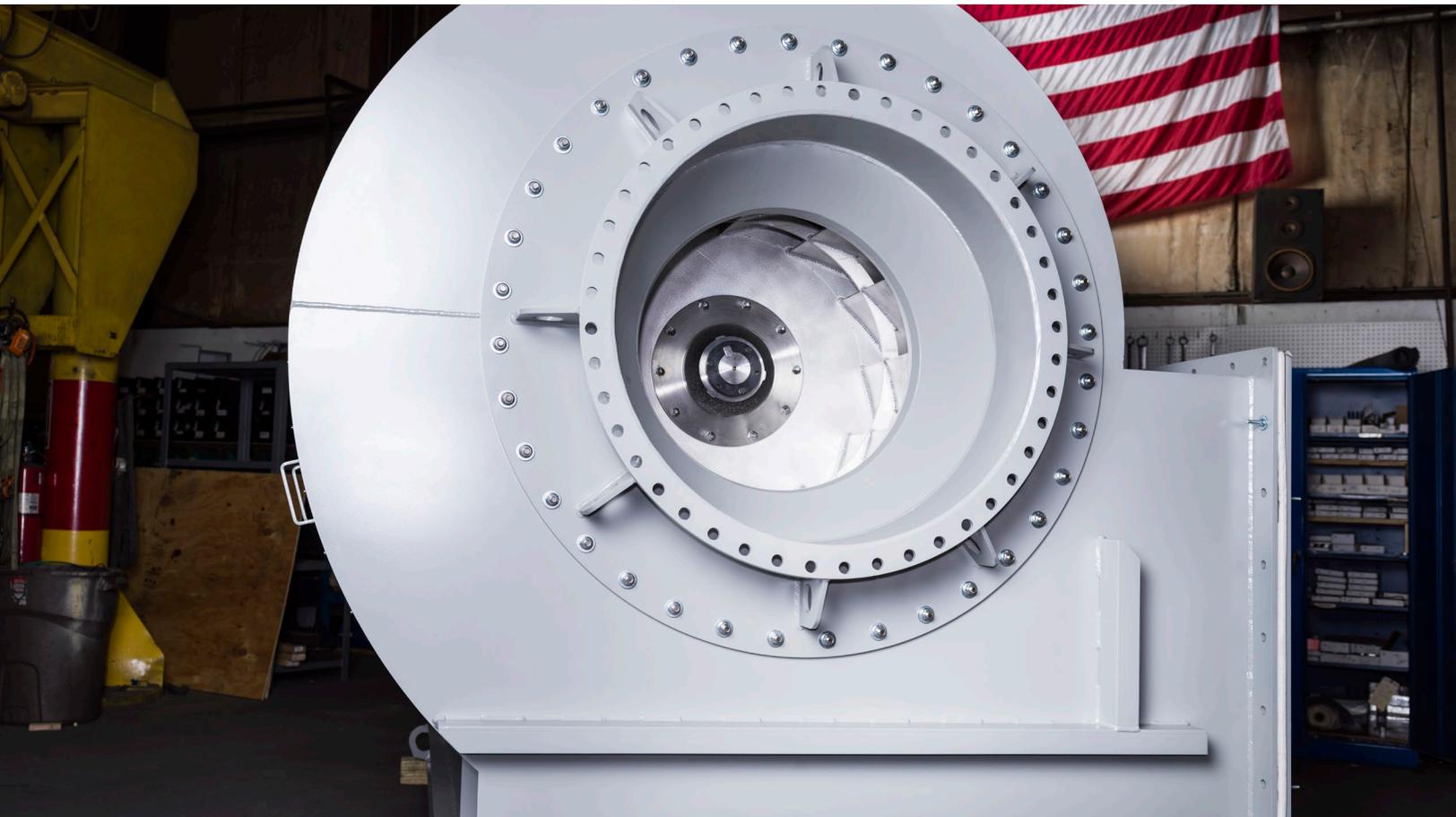
Standard industrial fans and blowers have predetermined specifications, such as wheel size and horsepower, catering to general needs. These units can offer a quick and inexpensive solution but come with limitations. Standard fans or blowers may not meet specific operational requirements or match the required efficiency needed for the application.

Semi-Custom

This solution creates a middle ground, offering some customization, like coatings or component options. While semi-custom fans and blowers can help achieve some operational characteristics, such as corrosion resistance, these solutions may still require trade-offs and design compromises that don't allow the final system to achieve optimal performance.

Fully Customized

Fully customized fans and blowers offer dramatically expanded capabilities. Every area, from the airflow dynamics to the final build, is tailored to fit the exact requirements of the application. Especially for industries with specialized or stringent requirements, custom industrial fans and blowers are the best solution to ensure that all operational requirements are met.



WHY CHOOSE **CUSTOM?**

Fully customized fans and blowers enable broader design possibilities, enhancing overall system performance while reducing or eliminating compromises. Here are some specific areas where customization adds value:

Aerodynamic Efficiency

Custom industrial fans and blowers optimize the relationship between speed, air flow, pressure and power consumption—also called the “fan laws.” In addition, computational fluid dynamics are used to simulate airflow and predict performance under various conditions. These calculations inform the precise adjustments that can be made to fan blade angles, diameters, speed and other aspects, ensuring that the fan operates as close as possible to its greatest efficiency point.

Size Reduction

When spatial constraints are a factor, fully custom blowers can often be designed to fit a specified envelope without sacrificing performance. This may involve innovative approaches to component layout and motor integration, as well as higher-speed fan offerings utilizing advanced materials to provide strength without bulk. 3D modeling tools can help visualize and manipulate the fan design to ensure the fit within tight spaces.

Downtime Minimization

A standard fan or blower in a demanding application may have faster belt and bearing wear, more motor strain and higher levels of contaminant build-up. These can lead to excessive maintenance requirements and create failures that cause downtime. With fully customized fans, tailored design choices can specifically address the unique conditions of the application. This leads to a more reliable fan, a longer equipment lifespan and significant downtime reduction.

Cost Savings

With standard fans, engineers may be forced to choose an off-the-shelf product that is bigger (and more costly) than needed because the next size down would be too small. This compromise adds significant unnecessary costs. First, the fan itself costs more. Second, maintenance costs for an improperly sized fan will be higher. Finally, the excess energy necessary to run the oversized fan over the long term can add up to more than double the cost of the fan itself.

Noise Suppression

Custom fans and blowers can be engineered for better acoustic performance, which is an important consideration in work environments where noise levels impact worker safety and comfort. A few of IB International’s noise reduction techniques include installing acoustic jackets and housings, anti-vibration mounts and specifically designed inlet and outlet silencers.

Environmental Compliance

Environmental concerns are a driving force in most industries requiring air movement solutions, and custom fans and blowers can be designed to specifically address specific governing body regulations, including local ones. By customizing fans and blowers, engineers can better meet the environmental needs of their end-users.

Durability Improvement

Fully custom fans and blowers can be constructed using materials and coatings selected for their durability and performance under specific environmental conditions. Corrosion-resistant alloys, like stainless steel and titanium, and special coatings can be applied based on the specific chemical, thermal and mechanical stresses expected in the application. Such customization helps ensure that the fan or blower will maintain its integrity and performance under demanding conditions.

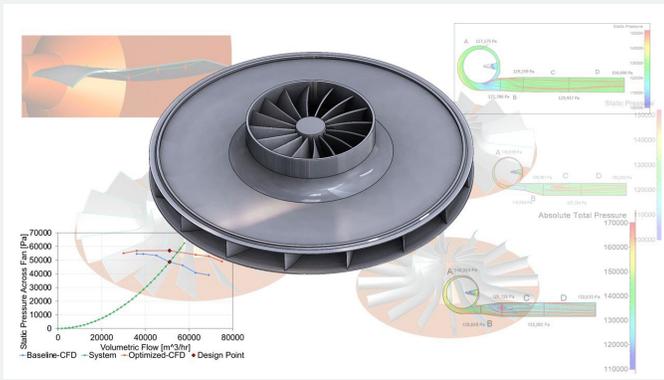
Energy Efficiency

The operational cost of electricity for a typical fan or blower can be up to ten times its initial purchase price. By custom-designing fans to suit specific operational parameters, manufacturers can significantly reduce the energy consumption of these systems. In addition, incorporating variable frequency drives (VFDs) allows for speed adjustments that match system demands and save energy by not always running at fixed speeds.

Engineering Collaboration

Fully customized fans and blowers typically involve a more collaborative process. Questions will naturally arise, such as those about the necessary performance requirements, national or international standard necessities and the environmental considerations of the project. By engaging in ongoing dialogue, both parties can work together to create a perfectly tailored product that maximizes overall performance.

CASE STUDY

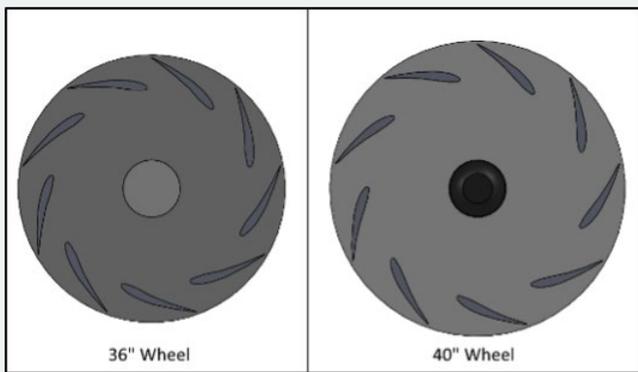


Higher Pressure and Increased Performance

IB International partnered with NUMECA to design a solution that increased fan system pressure without increasing impeller speed or diameter. By identifying the main performance parameters and their influences, the team was able to isolate the primary limiters of optimization. Next, the team ran multiple simulations to optimize the impeller blade. The combined computations resulted in a significant overall performance increase of 44% while maintaining the original design constraints.

[Read the full story >](#)

CASE STUDY



Increasing Performance While Altering Design Specs

A customer had a 48" box fan installed at their site, and the initial performance requirements called for a 36" diameter wheel. After 10 years of operation, the customer wanted to increase its performance but could not increase the size of the fan housing. We used Computational Fluid Dynamics (CFD) simulations to create a baseline flow study matching the current performance, and then we progressively widened the wheel and performed additional flow-rate tests to confirm the box fan could meet the customer's flow and pressure targets. The final design, which necessitated trimming the cone to allow proper fit, achieved a 12% gain in static pressure and at least a 31% gain in volumetric flow.

Common Fan Types for Industrial Fans and Blowers

Fully customized fans and blowers from IB International employ a range of two fan types: axial and centrifugal.

Axial Fans

These include propeller fans, vane radial fans and tube axial fans. In these designs, the blades rotate parallel to the airflow direction, efficiently moving air along the axis of rotation.

Centrifugal Fans

These are characterized by their diverse blade configurations, including radial, backward curve, airfoil, backward incline and radial tip. The fan blades in centrifugal fans rotate perpendicular to the airflow.

Key Industries for Custom Solutions

Customized air movement solutions add value in multiple industries, including:

Oil and Gas

Custom fans and blowers can enhance operational safety by managing ventilation in hazardous areas. These fans are specifically engineered to explicit standards, such as API 560 for fired heaters and API 673 for petroleum, chemical and gas industry services, handling explosive gases and preventing environmental contamination.

Power Generation

Within critical infrastructure, including cooling towers and boiler systems, custom fans and blowers can improve thermal efficiency and reduce energy consumption. Custom solutions adhere to various ASME standards and other customer-dictated requirements.

Manufacturing

Customized solutions can help control dust, regulate humidity and maintain air quality. These systems are tailored to specific production needs and meet various OSHA requirements for employee safety.

Chemical and Petrochemical

Fans and blowers in this industry may be designed to be highly resistant to corrosive substances, supporting processes like chemical extraction and waste gas treatment. Solutions often need to comply with customer and ASTM standards for materials that can withstand the rigors of these types of challenging environments.

Carbon Capture

Various carbon-capture initiatives require custom fans to be designed for gas handling and compression systems. These solutions optimize the capture of carbon dioxide emissions and enhance the efficiency of sequestration processes.



IB INTERNATIONAL: **CUSTOM SOLUTIONS FOR THE MOST DEMANDING CONDITIONS**

For more than 45 years, IB International has been recognized for its engineering excellence in designing and manufacturing custom industrial fans and blowers. Our U.S.-based team will collaborate with you to deliver high-quality solutions that meet your challenges and exceed your expectations.

To discuss whether a custom fan or blower can help improve the performance of your system, contact us at **847.639.5500** or visit us at **IB-Int.com**.

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