THE NEW YORK
BLOWER COMPANY

Why **Industrial Fans** Should be Tested Prior to Installation

With over 20 years of experience, **Andy Timm,** Manager of Laboratory Services at The New York Blower Company, explains the benefits of the most common tests for fans prior to shipment.

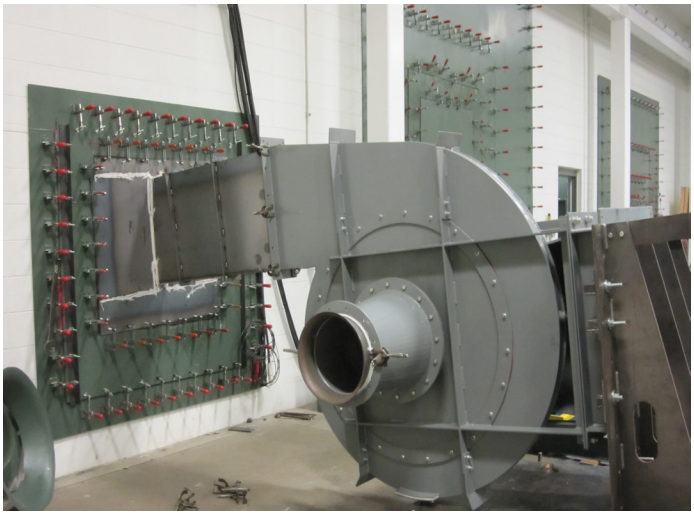
Thoroughly testing air moving equipment prior to deployment is critical to the success of any project. The benefits of the most common performance tests help to ensure successful implementation and reliable, long term operation--even in punishing industrial applications.

BR-243
10.01.21

OVERVIEW

Industrial fan deployments are complex, and every project faces unique challenges. In addition, the wide variety of punishing industrial environments introduce variables like high temperatures, high humidity, heavy dust loads, and certain sound environments that can affect the safety, performance and reliability of air moving equipment over time.

Rigorous laboratory testing verifies a fan's performance characteristics before it leaves the factory, helping to ensure the long-term success of the project and the reduction of unexpected maintenance and costly downtime. Therefore, it is critical to partner with an industrial fan manufacturer that is committed to quality assurance best practices and whose pre-deployment testing protocols meet AMCA standards for performance testing.



WHY AMCA CERTIFICATIONS MATTER

The Air Movement and Control Association (AMCA) is an international third-party organization that fan equipment manufacturers can use to substantiate published data points for their products' performance. A product is certified by AMCA when the data published by the manufacturer is within a certain tolerance of the data collected from a test conducted independently by AMCA. The product rating requirements and rating method details are found in AMCA Publication 211, *Certified Ratings Program - Product Ratings Manual for Fan Air Performance*. In addition, AMCA tests can establish or certify ratings in accordance with applicable ISO, ANSI, ASHRAE, AHRI, or other national standards.

AMCA certification offers assurance that the fan's performance aligns with what is cataloged. End users can rest assured that they have selected the most efficient fan for their performance criteria.

FIVE COMMON TYPES OF PRE-DEPLOYMENT FAN TESTING

The following are five of the most common tests requested prior to the installation of an industrial fan. These tests, when performed in an AMCA accredited laboratory which comply with AMCA standards where applicable, provide customers with peace of mind that their equipment will withstand the rigors of the application. Note that the exact tests performed may vary depending on the specific application requirements.

1. Air Performance Testing

Many industrial fan applications require precise flows and pressures. Chamber testing in an AMCA-accredited laboratory verifies that the fan performs as cataloged (typically open inlet, ducted outlet). This eliminates the fan as a potential source of problems during commissioning or diagnostics, saving the end user time and money.

Air performance testing is one of the most common tests performed before any industrial fan deployment. Air performance testing precisely defines the fan's performance characteristics including airflow rate, static pressure, horsepower, speed of rotation, and efficiency to ensure that the fan meets the required specifications for the application.

Air performance tests should comply with AMCA 210 Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating. This standard applies not only to the testing but also to the measurement chamber and reporting of results. In addition to documenting the test method and characteristics of the fan under test, the report contains the 10 equally spaced data points along the fan curve from near wide-open to near closed-off that were acquired during the test.

Air performance data is measured by laboratory-grade pressure transducers and rotary torque sensors of varying measurement ranges to accommodate the acquisition of differing maximum pressure and power values to be measured. Each data point acquired represents an average of five seconds of data from at least 8 measurement signals and is redundantly verified within the test setup. At nyb laboratories, our capabilities include the ability to test fan air flow values up to 130,000 cubic feet per minute (CFM).

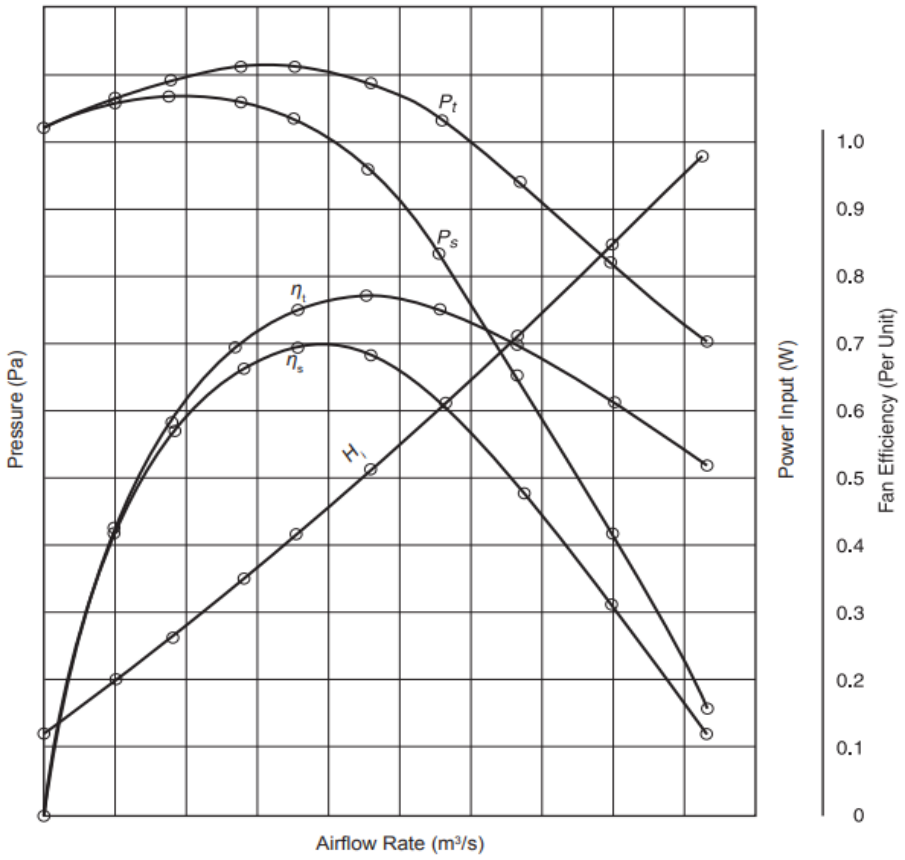


Figure 1: Example of an Air Performance Test in accordance with AMCA 210* Excerpted from AMCA Standard 210-16, Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating

2. SOUND/NOISE TESTING

Sometimes done in conjunction with air performance testing, sound testing (also known as noise testing) is performed to test the fan's sound performance characteristics. These tests are performed because fans are often located in areas where the reflective surfaces can impact sound performance. Sound testing the fan in an AMCA-accredited reverberant sound room provides the end user with additional data necessary to attenuate the fans as needed for the sound environment in which the fan will be installed.

Sound or noise testing should be conducted in accordance with AMCA 300 Reverberant Room Method for Sound Testing of Fans, which offers guidance on both testing and reporting. Conducting the sound performance test while running the fan at the customer's point of operation assures that the sound performance is measured by a random incidence microphone mounted to a rotating boom is most applicable for the fan installation.

3. TEMPERATURE TESTING

Depending on the fan manufacturer, there are different methods and objectives for how and why to perform temperature testing. One method is to place a coating sample in a box furnace, which controls temperature within 15 degrees and can test fan coatings at temperature ranges from 80 - 2012 °F. Temperature testing is essential for testing fans that will deployed in applications where the equipment will be exposed to high heat, even for short periods of time. For equipment constructed from fiberglass-reinforced plastic, some customers also require a glass content test (burnout test). In these tests, the fan's base material is placed in the box furnace at 1000 °F. Once the plastic burns off, the percentage of glass content can be determined.

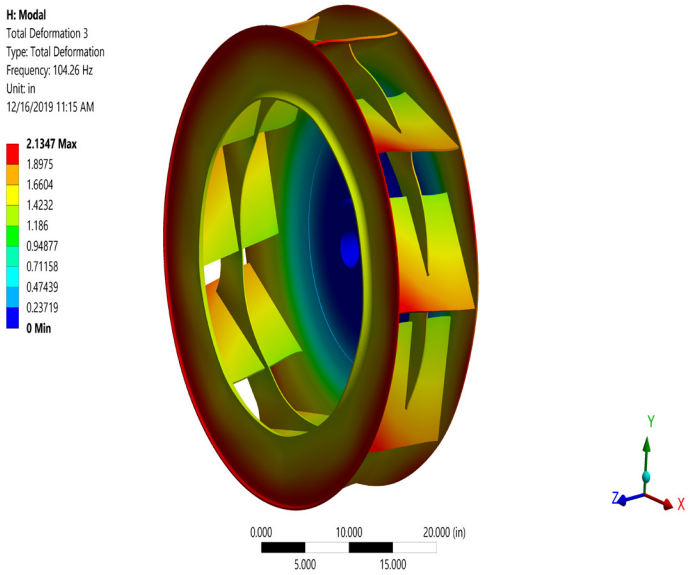
Temperature tests can be completed during the initial acceptance phase, to determine if a specific coating will stand up to the temperature demands of the application. For replacement units, temperature testing can be implemented if there is a change of coatings from the previous coating.

4. VIBRATION TESTING AND ANALYSIS

Vibration and temperature levels that are outside of a normal range can lead to premature fan wear and failure. Testing fan vibration levels prior to deployment ensures the longevity of the equipment. Typically, fans are vibration tested in accordance with AMCA Standard 204 Balance Quality and Vibration for Fans. However, some users will request an extended vibration test at the factory to ensure that bearing temperatures and vibration levels do not migrate during the specified time.

Mechanical run testing extends beyond standard fan vibration testing by running until fan bearing temperatures have stabilized to +/- 3° F and then checking fan vibration levels. Optionally, some applications require additional testing to measure bearing temperatures and vibration levels at specific time intervals and provide detailed performance reports. This test verifies bearing functionality and vibration levels during the initial bearing break-in period.

Another type of vibration analysis is **Operating Deflection Shape (or ODS)**, a method of analyzing how a fan's vibration characteristics are affected by the forces present during normal operation. ODS analysis is a valuable tool to determine how vibration affects the fan's structure and can also be used to approximate the mode shape associated with a natural frequency. In addition, ODS vibration analysis can provide insight into the effects of application variables—for example, to understand what the duct work is causing the fan to do. ODS vibration testing is often conducted diagnostically to troubleshoot problems.



5. OVERSPEED TESTING

Overspeed testing of the rotor ensures the safety and longevity of the fan by testing the critical component at a higher speed than it would encounter during normal operation. After running the overspeed test, every welded joint and hub attachment hardware is visually inspected to confirm that the fan's construction can tolerate the high speeds without developing cracks.

Testing fan rotors to higher-than-normal stress provides end users with the confidence that the rotors have been tested at speeds beyond the maximum operating speed—with no observable impact to the structural integrity of the rotor. This provides additional assurance that the fan will operate safely and reliably under normal operating conditions.

CONCLUSION

Pre-deployment testing is critical to the success of any fan installation, and it provides end users with confidence in the quality of the equipment's craftmanship. In addition to pre-deployment testing, performing a startup sequence is recommended to ensure that all equipment is installed correctly and to accommodate for any structural changes that may have occurred during shipment.

The New York Blower Laboratory is an AMCA accredited testing facility complete with six testing chambers as well as two separate data acquisition systems that can be run simultaneously. In addition, our testing capabilities are supported by best-in-class engineering teams in the fan manufacturing industry. Contact us to learn more.