



Blog | By Paulo Guedes-Pinto

Fan System Design: What Is the Required Airflow for My Application?

This blog post is the first installment in a series written about HVAC fan system design. The intent of this series is to guide readers through the important questions they should be asking themselves and their design team when designing a fan system. Infinitum's IEs Series electric motor is designed to work cohesively with HVAC and other industrial fan applications and can help alleviate common issues in fan system designs.

A common and costly mistake when designing a fan system is selecting a fan type based on its perceived efficiency or reliability before considering the necessary airflow rate and expected pressure loss of the final system configuration. Every fan design is optimized for a particular range of flow and pressure.

For example, high airflow rates with slight pressure difference (or no pressure difference) across the fan favors an axial design. Yet, many design professionals specify a more expensive centrifugal fan for these applications because of the perception that centrifugal fans are more efficient than axial fans. The peak efficiency of a centrifugal fan is usually higher than an axial fan, but at extremely low pressure differentials, lower cost axial fans perform better and even use less energy.

When designing a new fan system, we suggest beginning by asking yourself **what is the required airflow for my application?** A word of caution: there may be more than one answer to this question.

If you are designing a heating, cooling, and ventilating system (HVAC), the amount of heating or cooling and the temperature of the supply air will impact your answer to this question. Use of colder supply air for cooling is gaining popularity because the system requires less airflow. It is generally more efficient overall to move less

air at a lower temperature. The same is true for heat – using hotter supply air in a system with less airflow saves energy.

Economizer cycles, however, favor a different answer – increasing airflow to save energy. Economizers cool the building primarily by bringing in cooler outside air when the building demands cooling while the outside air is cool. If your system can take advantage of “free cooling” using outside air, you may have more than one answer to the question what is the required airflow for my application? In an economizer cycle, there may be two different airflow rates required for cooling and heating, respectively, and still another required airflow rate for pure ventilation based on CO2 levels in the occupied space. Both commercial and residential systems are being designed using different fan speeds and airflow rates depending on the system operating mode. Industrial processes also demand this kind of consideration.

Each application is unique and there may be more than one answer to the question: what is the required airflow for my application? The strong recommendation here is to consider different airflow rates to match the demands of the process, adjusting airflow when full flow is not needed.

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