

Operations

# HVLS FANS: Your HVAC System's Best Friend

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Whether it's done through a stand-alone heating, ventilation and cooling (HVAC) system, a set of conventional ceiling fans, or multiple floor fans, traditional methods of moving air in many commercial buildings and warehouses often fall short when trying to maximize airflow and employee productivity. That's why a growing number of decision-makers look to high-volume/low-speed (HVLS) ceiling fans, which maximize the efficiency and performance of air movement and — as a result — help cut energy usage and create more comfortable and productive working environments year-round.

## HVLS fans gain in popularity

HVLS ceiling fans have steadily gained popularity in recent years, and for good reason: a host of technical advancements and system designs have led to fans that efficiently circulate air in expansive areas of commercial facilities. Fans as large 24 feet in diameter are available, as are more compact fan designs which allow for more effective air circulation in smaller spaces and areas with limited ceiling heights (including residential buildings). Additionally, users can now control multiple fans located throughout a facility through a control

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station to optimize their year-round performance.

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HVLS fans are an attractive alternative to traditional fans, such as high-speed ceiling and floor fans for a number of reasons. A typical high-speed ceiling fan spreads air out quickly as it moves away from the fan. The result is that little, if any air, reaches people working at the ground level. High-speed floor fans, meanwhile, are noisy and create a blast of wind for a relatively small area. As such, they can be disruptive. Multiple floor fans can also increase clutter and the chance of mishaps involving equipment and electrical cords. Additionally, the localized, high wind speed they create can contribute to employee fatigue.

When used properly in conjunction with conventional HVAC systems, HVLS fans are a high value, cost-effective solution to better air movement and improved overall environmental control.

**Summer energy savings and comfort**

HVLS fans are used during warm months to cool spaces that are without air conditioning – and to supplement air

movement in air-conditioned facilities.

The advantage of HVLS fans is their ability to move large volumes of air and create a steady, light breeze. During the warm months, this breeze creates an evaporative cooling effect and reduces the effective temperature by 10 to 12 degrees F. Since HVLS fans can move large volumes of air over an area up to 22,000 square feet, a single HVLS fan can replace as many as 10 to 20 floor fans. In air-conditioned facilities, the breeze from an HVLS fan typically allows up to a 5 degrees F increase in thermostat setting with no change in employee comfort. That equates to an electric bill savings of 4 percent for each degree, resulting in an annual savings of 20 percent.

### **Better use of heated air in winter**

HVLS fans also help save energy and improve comfort during the colder months of the year because they allow facilities to make better use of heated air.

During the heating season, there is often more than a 20-degree F difference between floor and ceiling at most manufacturing plants and warehouses. This is a result of warm, light air rising and cold, heavy air settling. Typically, the air temperature will be one-half to 1 degree F warmer for every foot in height. As such, a heating system must work hard for extended periods to maintain the temperature near the floor, or at the thermostat set point, wasting precious energy and dollars.

HVLS ceiling fans mitigate the rising heat effect by gently moving the warm air near the ceiling back down toward the floor where it is needed. The air reaches the floor below the fan where it then moves horizontally a few feet above the floor. The air eventually rises to the ceiling where it is cycled downward again. This mixing effect, known as destratification, creates a much more uniform air temperature with perhaps a single degree difference from floor to ceiling. With the use of an HVLS fan, there is less of a burden on the heating system, saving energy and dollars.

Conventional high-speed ceiling fans have been used to help circulate air for many years. However, the smaller fans are ineffective in moving the warm air from ceiling to floor. A

typical high-speed ceiling fan spreads the air out quickly as it moves away from the fan. The result is that little, if any, air reaches the floor.

### Attractive return on investment

Because HVLS fans are efficient, their return on initial investment often ranges from six months to two years. Payback on an HVLS fan varies according to a number of application variables. As shown in Table 1, winter energy savings are substantial. Users can reduce their heating bills by 20 to 30 percent when using an HVLS fan to gently mix warm air from the ceiling with cooler air below.

**Table 1**

Winter savings	
Location	Winter energy savings*
Edmonton, Canada	\$3,620
Minneapolis, MN	\$2,845
Toronto, Canada	\$2,485
Cleveland, OH	\$2,395
Boston, MA	\$2,190
Kansas City, MO	\$2,125
Indianapolis, IN	\$2,080
Salt Lake City, UT	\$2,050
Seattle, WA	\$1,520

\*Typical annual winter energy savings possible based on 22,000 sq. ft. building with 30' ceilings a 70 degree temperature set point and natural gas at \$011 per cubic foot.

### A better workplace environment, and more

The goal at any operation is to create a comfortable and productive workplace environment, which is where HVLS fans play an important role. The fans also provide additional benefits that are specific to food manufacturers and distributors.

Although HVAC systems are increasingly prevalent, there are still many commercial facilities without air conditioning — and it can make for a very uncomfortable environment, resulting in a loss of productivity and employee morale. NASA study, [CR-1205-1](#) found that as effective temperature rises, work output and accuracy plummet.

HVLS fans create the proper amount of air speed and cooling sensation to address the issue. According to the U.S. Department of Health and Human Services paper, "Workers in Hot Environments," a 2-3 mph air speed creates a cooling sensation of 7-11 degrees F. The effective temperature corresponding to 84 degrees F and an air speed of 3 mph is 73 degrees F. Air moving faster than 5 mph can be disruptive and provides little, if any, added cooling benefit. A cooling sensation of 7-11 degrees F can make workers 10-35 percent more productive.

HVLS fans are also worthwhile for buildings where stagnant air creates an unhealthy environment. The use of HVLS fans can greatly improve air quality through better air circulation. The fans are often the most cost-effective way to accomplish this in large open spaces.

Another benefit of HVLS fans is their ability to greatly reduce floor sweat due to variances in surface-to-air temperature. It's an especially important consideration given the need to prevent slippage. In addition, improved air circulation and ventilation helps keep products and packages dry. It also improves quality control for stored products by keeping temperatures consistent from floor to ceiling, eliminating the need to rotate stock stored on racking.

### **Important considerations**

There are a number of factors to consider when deciding how and when to use HVLS fans. They include obstructions such as pallet racks, machinery and product staging; personnel work areas; and overall building layout, to name a few. Larger diameter fans will move air further down rack aisles and over obstructions. Smaller diameter fans can be most effective in specific work areas, or where installation space is limited.

Fan suppliers can help configure an array of fans, determining the number, size and locations that provide the maximum benefit for the investment. They can also offer turnkey installation where on-site resources are not available. While the basic concept is similar across all HVLS fan manufacturers, fan design and performance are key factors to consider. There are significant differences between manufacturers, including the shape and number of blades, blade tilt, hub construction, blade-to-hub connection, and safety features. The



performance of different designs will vary in the uniformity of air movement directly below the fan, as well as the height and reach of air movement outward from the fan's diameter.

Other important considerations include ease of installation, fan controls, local representative support, trial program availability, and warranties.

### **Capitalizing on the advantages**

The use of HVLS fans has gained increased attention as a practical and affordable solution to improved air movement and overall better environmental control. These types of fans are now recognized as a valuable supplement to help facility

designers and engineers to control energy costs and improve employee comfort and productivity. Capitalizing on the advantages of HVLS fans requires careful analysis of each application, as well as each HVLS fan design.

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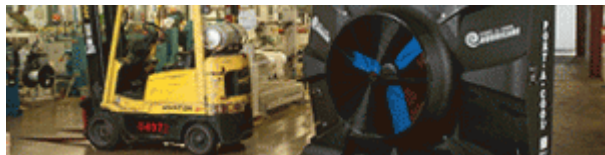
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