The Advantages of Choosing Centrifugal Fans
Introduction

Centrifugal fans are widely used for various commercial and industrial applications today. These fans are popular choices for automotive, heating, ventilation, and air conditioning (HVAC), and air handling systems for several reasons: centrifugal fans boast superior aerodynamic qualities, high efficiency levels capable of reaching up to 84% efficiency, and offer more means of control than other kinds of fans.

Centrifugal fans have constant airflow that is pulled in along the axis and expelled perpendicular to the axis—which helps give the fans their trademark high efficiency. These fans are cost-efficient alternatives to others since the centrifugal design is simpler, thus making it easier to manufacture.

Before choosing a centrifugal fan, you will have to consider factors such as what airflow will be required, the static pressure running through the system, and the airflow conditions (clean, dirty, dry, or wet air and its temperature), and many others.
Types of Centrifugal Fans

The different types of centrifugal fans have notable advantages depending on your specific application. There are six basic types of centrifugal fans to choose from, and though some share similarities, each of these fans has ideal uses.

Airfoil Fans

Airfoil fans are designed for high efficiency uses and are named for the style of blades they utilize. Designed for applications with higher airflow volumes and lower system pressures, airfoil fans operate with clean air only and they are the quietest of all centrifugal fans. Airfoil fans offer static efficiency to 84% and have a non-overloading horsepower curve—which means the fan’s motor will not overload if its horsepower exceeds the motor capacity, saving you both money and energy in the process. Airfoil fans are commonly used for large HVAC and industrial clean air systems that require the highest energy efficiency.

Backward Inclined Fans

Backward inclined fans have single thickness or “flat” blades. These fans offer better durability than their airfoil counterparts, but are somewhat less efficient (with up to 80% static efficiency). Backward inclined fans share many characteristics with airfoil fans, such as the high airflow and low-pressure design, low noise, and the non-overloading horsepower curve. Since they are so similar, backward inclined fans can be used for the same HVAC applications as airfoil fans; furthermore, backward inclined fans are better suited for corrosive or erosive industrial applications where airfoil fans aren’t acceptable. Backward inclined fans use light material, enabling easy and quick cleaning.
Radial Blade Fans

The blades of these fans are radial to the fan’s shaft. Radial blade fans are used in lower airflow, higher-pressure situations. Since they offer static efficiency to 70%, radial blade fans are the least efficient of all centrifugal fans. Like radial tip fans, radial blade fans operate at lower RPMs and generate more noise, but have good material handling capabilities. The large wheel diameter of these fans results in higher costs, but with added cost comes an easy to maintain fan (with self-cleaning characteristics) capable of being used in high pressure, high temperature, and corrosive applications with dirty air.

Forward Curve Fans

Forward curve fans are named for their blades that are curved in the direction of the wheel’s rotation. These fans are used for the highest volume of airflow and low pressures. Offering static efficiency up to 65%, forward curve fans are less efficient than both backward inclined and airfoil fans. Though less efficient than other centrifugal fans, forward curve fans require the lowest speed to move air, and they are generally available in smaller size selections. These low noise fans are ideal for low pressure, high temperature, and clean air applications.
Backward Curve Fans

Backward curve fans have blades that are curved in the opposite direction of the wheel's rotation. These fans are also useful for higher volumes of airflow with lower pressure; in fact, with static efficiency up to 84%, backward curve fans match the output of airfoil fans and have the lowest noise of all centrifugal fans. Also like airfoil fans, backward curve fans have a non-overloading horsepower curve. Backward curve fans can only process clean air, and are highly efficient despite their compact dimensions.

Making the Best Possible Choice

Your choice of centrifugal fan will ultimately depend on your specific application and its exacting requirements. These centrifugal fans types are all efficient choices, but you may have to sacrifice some characteristics for others. For example: forward curve fans have superior airflow, but they require additional motor power to operate at peak efficiency; and radial blade fans are easier to maintain and can be used for many rugged applications, but have higher costs.

Whichever centrifugal fan you decide on, you can be assured that your system will be running much more smoothly and efficiently than any other kind of fan chosen for the job.