

## Direct Drive Fans



### Maintenance and service costs

Annexair has recently introduced the use of direct drive fans (DDFs) as a primary choice on all its ventilation units. Annexair believes that within several years direct drive fans are going to become the industry standard. As an innovative company Annexair has taken upon itself to lead this trend.

Why direct drive fans? DDFs are superior to belt drive fans on many levels. Eliminating the belt and pulley system entails many advantages that are expressed in significant savings in operation costs. The most outstanding benefits are outlined below.

A direct drive fan *does not require maintenance*. There are no parts that can wear out or break. The routine maintenance of lubrication and belt tensioning is eliminated, as well as service calls related to belt/pulley mechanism malfunction. With the rising costs of maintenance labor, savings to building owners can reach 20-30% of maintenance expenses.

### Low noise level

Much of the noise in ventilation units is created by the moving belts. Without a belt, the sound level is frequently *lower by 3-9 dBA*. As a result, sound attenuation components can be smaller, and in some cases are not required at all. Smaller sound attenuators decrease the degree of static pressure drops. Savings are in both initial installation cost and in improved system efficiency.

### Motor longevity

By nature of design, DDFs must be controlled by a variable frequency drive (VFD). The controller acts as a soft start, greatly reducing the stress on the motor, and therefore minimizing the risk of motor failure.

### System efficiency

Eliminating drive losses from the belt and pulley can *improve mechanical efficiency by up to 5%*.

### Power consumption

With the variable frequency drive, the fan can operate below the motor's FLA so power consumption is lower.





How long does it take to balance the system?

What is the effect on cabinet size?

Why use a dual fan configuration?

Is the fan construction strong enough?

Is it true that TEFC motors are needed for DDFs?

What are the pitot tubes used for?

Are isolators still required?

Why aren't direct drive fans already used everywhere?

Introducing a new technology is likely to raise many questions and maybe apprehensions among engineers. DDFs have been in widespread use in Europe for a number of years, and the experience accumulated there provides a solid base to rely on. Some of the frequently asked questions are addressed below:

Balancing a system with DDFs is faster and simpler. Using the keypad of the fan controller, select the frequency that provides the required cfm. With today's motors, you can ramp up to 90 Hz or down to 10 Hz without any difficulty.

The cabinet is usually smaller. DDFs occupy less space than equivalent belt driven fans, since much of the structure needed to support the motor and belt drive mechanism is not required.

It is always more cost effective to use two smaller fans with two smaller motors and only one VFD (one controller can operate many fans) than a single large fan and motor. In addition, a dual fan configuration is usually lighter and more compact. Studies show that air flow is more evenly distributed with two or more fans due to reduced pressure gradients across the fan.

The fans are designed and built to withstand their operating conditions. The use of better manufacturing and welding techniques helps create a strong and rigid structure with smaller physical size.

Not anymore. The construction quality of ODF motors has improved significantly. Better welding techniques and the use of extruded aluminum pieces greatly increased the motor's rigidity. Also, high efficiency motors and premium ODP's are now built to withstand the variations in voltage and current flux.

Every single fan can be used as an airflow monitoring station with the addition of pitot tubes. Pitot tubes, along with a transducer, can measure the pressure through the cone which translates to cfm. Pitot tubes cause no obstruction to the air stream which is a typical problem with airflow probes.

Direct drive fans vibrate less compared to fans with belt and pulleys. In fact, for vertical installations, isolators are not required at all. For horizontal installations, smaller springs or even rubber isolators are sufficient, even for fans as large as 36".

In Europe, 80% of commercial ventilation units sold today are equipped with direct drive fans. In The US, the industrial and heavy commercial fields have already recognized the benefits of DDFs, especially the reduction in maintenance, and are already changing their specifications to require them. Hospitals and cleanroom applications often require DDFs in order to reduce the black soot created by the belts. The current decrease in costs is making the use of DDFs affordable to more industry sectors.

