1323 Columbia Dr.
Suite 305
Richardson, Texas 75081
www.balancevibration.com

TACLA010630C
Phone (214) 733-8771
Fax (972) 671-9468

"To Drive or Not To Drive"

Variable Frequency Drives VS Controllable Pitch Vane axial Fans

With all the concern with energy savings and efficiency, VFD's have taken over a large percentage of motor controls. While this has helped with equipment efficiency in many applications, it has created havoc in some. Controllable pitch vane axial fans are one of these problem areas.

Most applications of these fans are a variable air volume system (VAV). To install VFD's on these fans, they must be converted to a fixed position, usually at the top end of performance. This presents problem #1.

The pitching components do not go away as they are part of the fan design. Seizing and binding of these parts will occur if maintenance is not performed on regular intervals. Even more so now due to bearings, bushings and pistons that were designed to roll or slide are now stationary with thrust loads applied. Thus, there is no benefit or cost saving on maintenance due to this change.

Both will require less horsepower consumption with a reduction in air volume. The controllable pitch fan will maintain the same tip speed while changing blade angle which allows it to maintain the desired pressure while reducing volume. A VFD controlled vane axial will reduce its tip speed to reduce volume. This presents problem #2.

Fan pressure will vary as the square of the speed increases or decreases. At a given speed, (depending on fan design, plenum and duct design and system requirements) the performance will drop off the design curve. Static pressure will drop off and controller will call for an increase in speed. To get in the performance area will result in excessive pressure, and will go back and forth in a hunting condition. Most successful conversions have a system where the fan operates within 70-80% of full capacity.

Third and last are motor cooling issues and most importantly, rotor natural frequencies. These rotor criticals must be identified and programmed as critical jump frequencies in the VFD. Typically at these design speeds, the manufacture has the operating speed above these criticals. Subsequently, by dropping speeds below the design you will subject the equipment to one or more of these rotor criticals which if left to operate in these frequencies will cause catastrophic failures. After programming the drive to jump or skip these frequencies, you will further compound hunting issues by forcing the drive to jump around the frequency range of the critical.

If this is not enough, manufactures of these fans do not support or recommend this change. There is little or no energy savings for as volume is reduced, system energy requirements are practically identical for both fans.

WE RECOMMEND, DON'T DRIVE!!

Ron Ferrante
Manager- BVT