US DRIVES, INC.

Made In the U.S.A.

US Drives Inc.
2221 Niagara Falls Boulevard
P.O. Box 281
Niagara Falls, NY 14304-0281
Tel: (716) 731-1606 Fax: (716) 731-1524
Visit us at www.usdrivesinc.com

APPLICATION NOTES

- Centrifugal Fans - *Energy Savings / VFD Payback Analysis*

The energy savings potential for your fan based system when upgrading to **US Drives Variable Frequency Drives (VFD's)** is dependent upon several factors. Some of which are the original design philosophy of the system, the flow modulation method, system duty cycle, and your cost of electricity.

If the original design philosophy was to design for the worst case maximum flow condition for a future requirement or the designer used the usual 20% oversizing criteria, your potential for savings is very good. If, however, expansions have occurred over time and the system is near full flow capacity, your potential for savings may be limited.

The existing flow modulation method used on the system will determine the potential for energy savings when using VFD'. The savings potential is quite large if there is no modulation present as in the case of **Constant Volume** or **Uncontrolled** systems. **Outlet Damper** controlled systems use less energy than those using constant volume but the savings potential when using VFD's is still quite high. Systems using **Inlet Guide Vanes** are even more energy efficient than the above methods, but still leave the possibility for savings. Figure 1 illustrates the system curves for the above mentioned flow control methods.

The **Duty Cycle** of your system (where the system operates and for how long) will also affect potential savings. If, for instance, the system tends to operate close to the **Design Point** for the majority of the time, the savings potential through speed control is limited. On the other hand, if the system is operating at reduced flows for extended periods of time, the potential savings by using VFD's is great.

Obviously, the cost of electricity plays a major role in your consideration of whether motor speed control makes economic sense. If the rate of electricity is $0.02 per KWHr, the chances are slim that you'll be able to cost justify a Variable Frequency Drive for your system. However, If the electricity rate is $0.10 per KWHr or higher, you can expect to show fast paybacks for virtually any system.

Table 1 gives an indication of the energy savings realized by applying **US DRIVES VFD's** to building fans. Although each system has its own characteristics, (fan curve, fan efficiency, design point, duct losses, motor efficiency, etc.) the typical savings expected on different motors can be estimated.

Table 1
Typical $ Saved Per Year On HVAC Building Fans*

	Constant Flow	Output Damper Control	Inlet Vane Control	With US Drives VFD
30 HP	None	$3,200	$9,000	$15,200
50 HP	None	$5,400	$15,000	$25,400
100 HP	None	$10,800	$30,000	$50,800
250 HP	None	$27,200	$75,400	$126,600
400 HP	None	$43,400	$120,600	$202,400

*Based on a conservative $.10 per kilowatt hour and 8000 hours of operation per year.

The information necessary to run a VFD Payback Analysis for your fan system is indicated on the "Centrifugal Fans Energy Savings Program Data" sheet (Doc. # 3010).

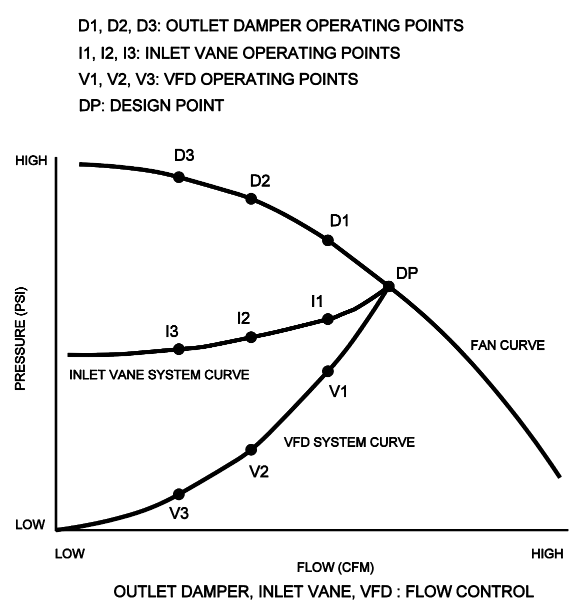

Figure 1.

US Drives Inc.
2221 Niagara Falls Boulevard
P.O. Box 281
Niagara Falls, NY 14304-0281
Tel: (716) 731-1606 Fax: (716) 731-1524
Visit us at www.usdrivesinc.com

US DRIVES, INC.

Made In the U.S.A.

APPLICATION NOTES

- Centrifugal Fans - *Energy Savings / VFD Payback Analysis*

CUSTOMER DATA:

DATE: ____________

CUSTOMER NAME ____

PROJECT NAME ____

CITY ________________ STATE/PROV _____ ZIP/POSTAL CODE __________

CONTACT ____________________ PHONE _________ #FAX ______________

APPLICATION PARAMETERS: DATA

FAN EFFICIENCY .... ________ %

DESIGN FLOW... ________ CFM

DESIGN PRESSURE .... ________ PSI

________ IN. OF WATER

MOTOR HP .... ________ HP

MOTOR VOLTAGE... ________ VOLTS

MOTOR EFFICIENCY .... ________ %

COST OF ELECTRICITY... ________ /KWH

METHOD OF CONTROL (SPECIFY 1, 2 or 3) .... ________ SELECTION

1: UNCONTROLLED
2: OUTLET DAMPER
3. INLET VANE

DUTY CYCLE (SPECIFY 1 or 2) .... ________ SELECTION

1: USE TYPICAL DUTY CYCLE AND **SPECIFY** TOTAL OPERATING HOURS/YEAR ______ HOURS
2: USER SUPPLIED (SEE BELOW)

DUTY CYCLE DATA:

OPERATING POINT	1	2	3	4	5	6	7	8	TOTALS
% FLOW	___	____	___	____	____	____	____	____	________
HOURS	___	____	___	____	____	____	____	____	________