



TECH TIP #8

VFD APPLICATIONS IN THE BOILER ROOM

Just as our industry is discovering electrical power savings through the application of variable frequency drives controlling motors on air handlers, circulating pumps, cooling tower fans and many others pieces of equipment, the boiler room is no exception. Two motors to better control are the fan motor on the burner and the boiler feed pump (on a steam boiler). Although small motors can be controlled by drives, the larger the motor, the more potential for savings. Steam boilers larger than 200 Boiler HP can be considered candidates. Special boiler control systems are necessary to generate signals which can be used by VFDs. (See Tech Tip #9) This is most easily added if a new boiler is being ordered or an existing boiler is being re-controlled.

Electrical savings from 5-50% can be expected! Savings depend on the application, but the more the boiler runs at part-load, the more the savings. If the combustion air and feed water can be controlled with a VFD rather than primarily a fan damper or water valve, there are savings.

Following are two examples of calculations of savings on larger boilers. TechStuff software (on the Federal website) is used in these examples. Example 1 shows the calculations on a 30 HP blower motor on a burner. Example 2 shows savings on a continuously run boiler feed pump. Let a sales professional at Federal help you survey your boiler room for possible savings.

EXAMPLE 1

Variable Frequency Drive Applications

Customer: **Airline Service Center**
 Application: **Combustion Air Fan Control**

Electrical Power Optimization
Combustion Air Fan VFD

Need to know	Motor Horsepower	30	
	Motor Speed as supplied	1850	
	Hertz - Name Plate	60	
	Rated Torque Ft/Lb	85	
	New Hertz	37	
	New Motor Speed	1141	
	New Torque Ft/Lb	85	NOTE: Torque should remain constant but Horsepower will change
	Change in Motor Speed %	38.33%	
	New Horsepower @ New Speed	18.50	
Prefer to know	Original Amp Draw	32	
	Cost of kW of Electricity	\$ 5.500	
	Total Hours of Operation/Year	5500	
	Is Application Pump or Fan? (P or F)	FC	
Control Methods Code - See List Below			
	Variable Frequency Drive	VFD	0.4
	Discharge Control Valve	DV	0.94
	Bypass Valve	BV	1
	Inlet Guide Vane	IG	0.82
	Outlet Damper	OD	0.88
	Fan Curve	FC	0.88
	No Control	NA	1

NOTE: WHEN USING KNOWN AMP DRAW MOTOR HORSEPOWER ENTRY IS IGNORED. IF YOU WANT TO COMPARE MOTOR HORSEPOWER ENTER A "0" IN AMP DRAW TO JUST REVIEW MOTOR DATA ONLY.

Results		
kWh	26.582	Kilowatt Usage Standard Motor No Control
kWh	13.801	Kilowatt usage using VFD at New Horsepower
kWh	23.401	Kilowatt Usage Using Current Control Method
kWh	9.600	Kilowatt Savings Converting from Current Control Method to VFD
Savings	\$ 2,903.98	Annual Energy Cost Savings By Converting to VFD

EXAMPLE 2

Variable Frequency Drive Applications

Customer: **Airline Service Center**
 Application: **Boiler Feed Pump**

Electrical Power Optimization
Feedwater Pump VFD

Need to know	Motor Horsepower	25	
	Motor Speed as supplied	3600	
	Hertz - Name Plate	60	
	Rated Torque Ft/Lb	36	
	New Hertz	40	
	New Motor Speed	2400	
	New Torque Ft/Lb	36	NOTE: Torque should remain constant but Horsepower will change
	Change in Motor Speed %	33.33%	
	New Horsepower @ New Speed	16.87	
Prefer to know	Original Amp Draw	29	
	Cost of kW of Electricity	\$ 5.500	
	Total Hours of Operation/Year	5500	
	Is Application Pump or Fan? (P or F)	P	
Control Methods Code - See List Below			
	Variable Frequency Drive	VFD	0.4
	Discharge Control Valve	DV	0.94
	Bypass Valve	BV	1
	Inlet Guide Vane	IG	0.82
	Outlet Damper	OD	0.88
	Fan Curve	FC	0.88
	No Control	NA	1

NOTE: WHEN USING KNOWN AMP DRAW MOTOR HORSEPOWER ENTRY IS IGNORED. IF YOU WANT TO COMPARE MOTOR HORSEPOWER ENTER A "0" IN AMP DRAW TO JUST REVIEW MOTOR DATA ONLY.

Results		
kWh	24.099	Kilowatt Usage Standard Motor No Control
kWh	12.433	Kilowatt usage using VFD at New Horsepower
kWh	22.653	Kilowatt Usage Using Current Control Method
kWh	10.220	Kilowatt Savings Converting from Current Control Method to VFD
Savings	\$ 3,091.47	Annual Energy Cost Savings By Converting to VFD