POET's VFD Cost Reduction Effort

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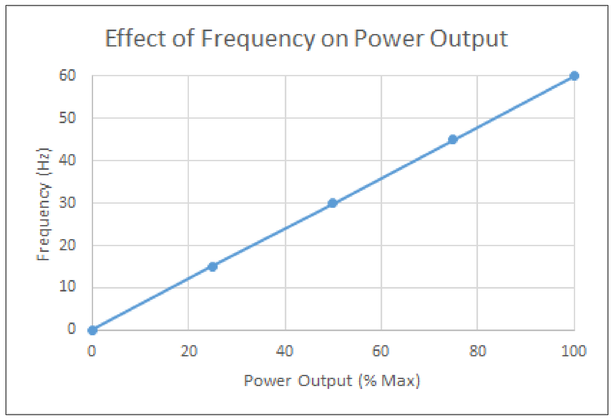
Introduction

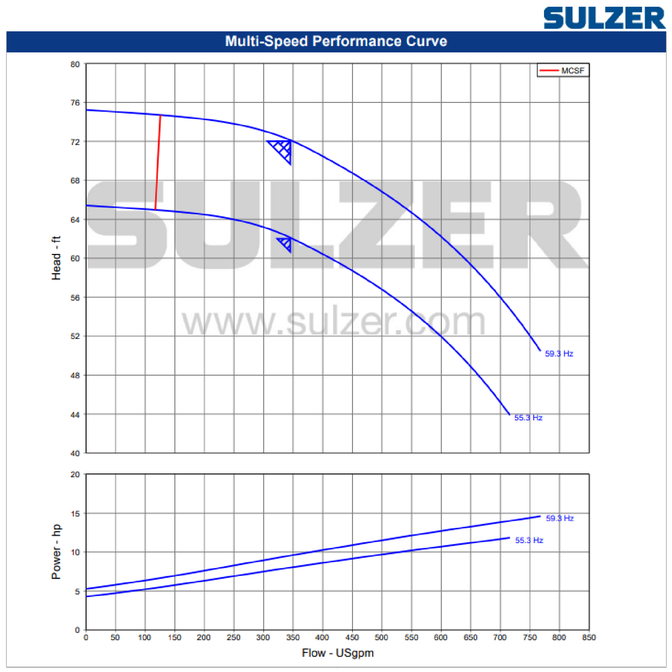
Variable Frequency Drives (VFDs) can be used to control the flowrate of pumps by modulating the speed that the pump operates at. This is advantageous because the traditional method of controlling flow with a control valve means that pressure will be lost across the valve. With a VFD controlling the fluid flow, energy costs are reduced without the high pressure drop across the open control valve. POET tasked us with finding the savings that could be possible by using a VFD in part of their process.

A VFD control module installed in the motor control center along with other motor control units. The VFD can then interface with the control system for the facility.



Typical electrical power in the US is 60 Hertz. A VFD modulates the frequency of the incoming electricity. This reduces the speed of the motor turning the pump's impeller. When pumps don't have to work as hard, electrical costs are reduced!

Sulzer Select Data

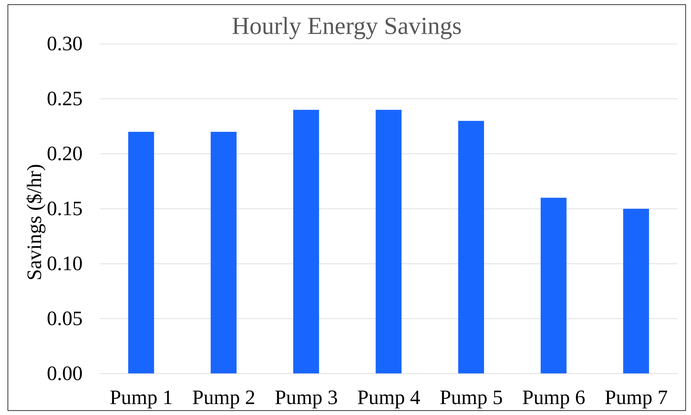


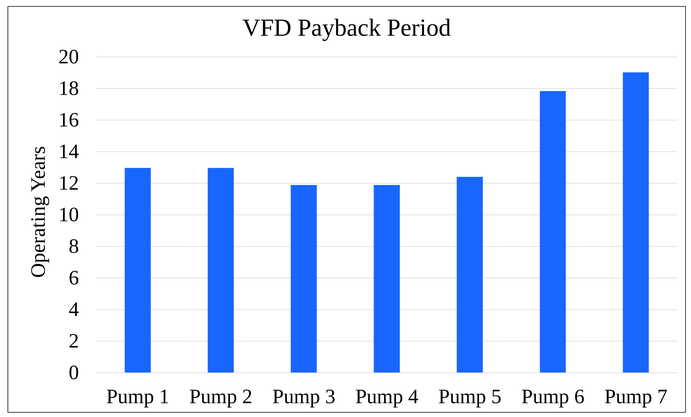
Sulzer provides pump curves for all their industrial pumps, some of which are used by POET. These pump curves allow us to find the reduction in power by knowing head the pump currently provides and what head is available after the control valve. We can then see the power requirements and frequency that a VFD would need to provide.

Pump ID	P-511	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6	Pump 7
Flowrate (GPM)	345	300	300	350	250	200	150
Psi Trottled	75	70	90	90	90	45	45
Psi Open	62	60	80	80	80	35	35
NPSHr Throttled (ft)	9.6	9.4	12	11.8	12.3	6.6	6.8
NPSHr Open (ft)	8.4	8.2	10.7	10.6	11	5.2	5.4
Power Thottled (hp)	27	24.7	34.3	36.4	32.4	11.9	11
Power Open (hp)	22.3	20.1	29.3	31.3	27.6	8.5	7.8

For our project, we simulated the throttled and unthrottled pump set-ups to find the power requirements. Using the power requirements, we found the electrical savings using Indiana's average cost of industrial power.
Our baseline VFD was estimated at $ 25,000.

Results





The VFD system reduced power usage in the pumps and results in savings of anywhere from 15 to 24 cents an hour. This effect would be amplified when considering peak-load electrical costs. It is more economical to install a VFD when the pump pressurizes to a high pressure.

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