

Return on Investment of a VFD Drive for Centrifugal Pump

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Abstract : Electric motors are the single biggest consumer of electricity, and the consumption will have more than to double by 2050. Meanwhile, the existing technologies offer the potential to reduce the motor energy demand by up to 30 %, whereas the know-how to realise energy savings is not extensively applied. That is why the authors first conducted a detailed analysis of the regulation of the electric motor market in North America To illustrate the colossal energy savings potential permitted by the VFD, the authors have equipped experimental setup, based on centrifugal pump, simultaneously equipped with regulating throttle valves and variable frequency drive VFD. The obtained experimental results for 1.5 HP motor pump are extended to another motor powers, as centrifugal pumps that are different in power may have similar operational characteristics if they are located in a similar kind of process, permitting the simulations for 5 HP and 100 HP motors. According to the obtained results, VFDs tend to be most cost-effective when fitted to larger motor pumps, in addition to higher duty cycle of the motor and relative time operating at lower than full load. The energy saving permitted by the VFD use is huge, and the payback period for drive investment is short. Nonetheless, it's important to highlight that there is no general rule of thumb that can be used to obtain the impact of the relative time operating at lower than full load. Indeed, in terms of energy-saving differences, 50 % flow regulation is tremendously better than 75 % regulation, but a slightly enhanced relative to 25 %. Two main distinct reasons can explain this somewhat not anticipated results: the characteristics of the process and the drop in efficiency when motor is operating at low speed.

Keywords : motor, drive, energy efficiency, centrifugal pump

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