

Case study

VIDAR Enhances Grain Processing Plant Efficiency with Energy Savings

When ITT VIDAR was presented to the knowledgeable plant engineering staff at a historic midwestern grain processing facility, they could quickly identify some practical benefits and inherent advantages of a novel approach to adjustable speed on pumps and fans.

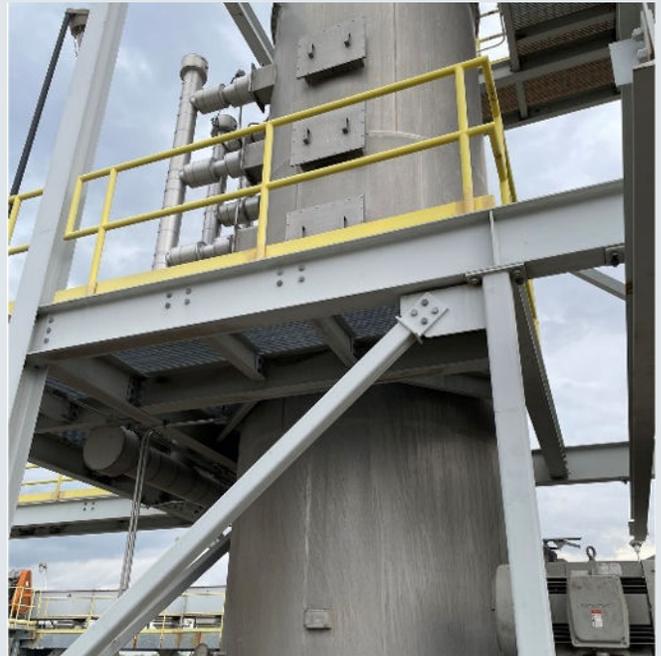
According to the plant lead electrical engineer, Andrew Temple, "Upon learning of the VIDAR technology, we could immediately see several applications where this was a perfect fit. Working at a facility that is over 80 years old has its challenges in switch room real estate so having an all-in-one variable speed motor saved considerable money and time." In fact, this is very common within industry as VFD projects often require installation considerations that can be quite challenging and costly. It is especially true when trying to retrofit an existing pump using a control valve to adjustable speed with a VFD. With VIDAR, there is no need for MCC room space, and it is estimated that total installed cost savings range from 30- 56% due to reduced materials, labor and engineering expenses compared to a VFD. Therefore, it was advantageous to investigate further.



Achieved benefits

-  **Saved space with simplified installation**
-  **Improved energy efficiency**
-  **Eliminated mechanical controls**
-  **Enhanced operations**
-  **Reduced downtime**

The decision was made to install VIDAR on a recirculation pump originally designed for a higher capacity. The application did not yet have a VFD as the electric motor driver was operating at full speed, and the pump discharge was fairly throttled back to achieve the needed flow rate of 1,050 GPM. It was determined to be a suitable candidate since energy savings and reducing indirect carbon emissions had strong potential, and it was attractive since it was utilizing a 75 HP motor. VIDAR has proven on retrofit projects that power demand on fixed speed motors can typically be reduced by at least 50% through opening the control valve and lowering the operating speed to match the flow requirement. This was the strategy to be employed. An additional benefit construed by the plant engineers was the potential for ambient noise reduction. The location of the pump is in a small room which tends to amplify sound levels created by the throttled valve. Improving all aspects of the operation was the goal, and now it was up to VIDAR to make this a reality.



Original motor installation on recirculation pumps

The VIDAR retrofit motor installation turned out to be very similar to a standard induction motor as the NEMA critical dimensions matched for a 365T frame. The equivalent 75 HP VIDAR dropped right into place. Once mounting was secured, the same coupling was used to connect the motor to the pump. The compact VIDAR unit

which includes the AC-Link power converter appeared to be just like a severe duty rated TEFC motor. However, now there was integrated speed control and the ability to take a proportional reference signal from the DCS to regulate flow (GPM.) This functionality does require an additional step which is the installation of control wire and connection to the VIDAR Application Control Board (ACB) to receive the required I/O very similar to a VFD. For this case, the control wire and conduit run was fairly reasonable with a distance of approximately 150 ft.. A single analog speed reference is all that was required. There was no need for discrete signals as the plant engineer decided to use another unique VIDAR feature - maintaining the existing motor starter for start/stop commands to simplify the project even further. After some basic keypad programming, the VIDAR retrofit project was ready to operate.



Quantifying the results on this project proved to be helpful in understanding how VIDAR can make a difference. The total installation and startup time was approximately 8 hours. The process variable set point was 1050 GPM which would now be achieved with regulating pump speed while setting the control valve to 100% open. The operating speed was lowered from 1780 to 1360 RPM to match 1050 GPM. While energy savings is a primary objective, the physical wear and tear on all equipment components is significantly reduced as well when the demand power is lower. Some of these benefits take longer to evaluate over time in reliability calculations such as Mean Time Between Failure (MTBF.) However, there were many that could be measured and compared soon after the VIDAR motor went into service. Power, current draw, energy savings, indirect CO₂ emissions, annual equipment revolutions and audible noise could all be measured or reasonably calculated:

VIDAR installed as a retrofit interchange

Results	Control valve Fixed speed	VIDAR Variable speed	Savings
Flow rate	1050 GPM	1050 GPM	-
Control valve position	35%	100%	65%
Speed	1780 RPM	1360 RPM	420 RPM
Ambient noise	103 dB	80 dB	23 dB
Motor current	78.5A	34.2A	44.3 A
Motor power	72.8 HP	35.1 HP	37.7 HP
Annual energy cost	\$34,318	\$16,558	\$17,760
Indirect CO₂ emission reduction	308 tons	148.6 tons	159.4 tons
Revolutions per year	854 million	653 million	201 million



In the end, it was a seamless integration. The barriers and obstacles often encountered with VFD projects were overcome, and VIDAR proved to be the bridge to operational excellence. When asked on his conclusion following their experience with VIDAR, Andrew summed it up as follows, "After one year of the motor being in service, we have had vast improvement in process control as well as energy savings that has nearly paid off the entire cost of the motor. From an engineering, operations and maintenance perspective we are all firm believers in this new product. We've already purchased another and anxiously await putting it to work as well."

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in
touch



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