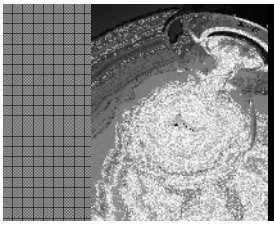

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Project: Siemens Energy & Automation Temple-Inland VFD Product Case History

Date: 8-08 Word count: 1872

(Headline)

A Proven Green Industrial Solution: Using Variable-Frequency Drives (VFDs) to Reduce Industrial Fan Energy Consumption

(Subhead)

By installing three 200-horsepower VFDs to control motor-driven drying fans, a Texas manufacturing plant saves $10,000 per month in energy costs while enjoying payback in less than six months.

According to the U.S. Department of Energy (DOE), industrial energy consumption accounts for approximately 32% of all U.S. energy usage – more than transportation, commercial, or residential use. With energy costs rising dramatically, and no immediate relief in sight, industrial companies – and industrial plant managers in particular -- are eager to see their electrical energy costs reduced and those savings fall directly to their organization's bottom line.

Meanwhile, in recent years, America's industrial base has enjoyed heavy investments in both new plant construction and in the retrofit modernization of the sprawling installed base. As of May 2008, year-to-year new construction for manufacturing was up more than 34%, power (including gas & oil) was up nearly 40% and electrical power construction increased more than 44%.

New Industrial Construction Put-in-Place Y-T-Y
Department of Commerce Expenditures Seasonally Adjusted Annual Rate May, 2008

Power, including Gas & Oil	$56.9 billion	+39.6%
Power, Electrical	$42.1 billion	+44.1%
Manufacturing	$53.6 billion	+34.3%

While few newly constructed industrial facilities strive to be green overall, there exists a mammoth opportunity for the introduction of green electrical solutions within the U.S. industrial market.

Driven in part by the increased interest in reducing energy costs, green construction is growing rapidly. McGraw-Hill Construction Analytics indicates the annual U.S. market in green building products and services has grown from over $7 billion in 2005 to more than $12 billion in 2007.

Fortunately, there are numerous technologies and system solutions proven to greatly increase energy efficiency and decrease energy consumption. By installing these updated systems, industrial plants increase their productivity and U.S. global competitiveness.

One of the most proven and widely used energy-reducing solutions for industrial applications is the Variable-Frequency Drive.

For decades, Variable-Frequency Drives (VFDs) have been successfully used by many types of commercial and industrial operations to introduce greater control over motor-driven applications. VFDs are used to adjust a motor's speed to closely match output requirements, resulting in typical energy savings of 10 to 50 percent, and are a proven approach to reducing the energy consumption of industrial motors, pumps, and fans in many types of applications.

Despite this fact, many industrial plants have yet to apply VFDs to applications that MRO plant managers and engineers consider as outside their traditional areas for drive use.

This is a missed opportunity, since according to the U.S. Department of Energy, electric motor systems account for nearly 70% of the entire U.S. manufacturing sector's electricity usage. This fact alone means that the application of VFDs in order to reduce the electrical current draw of industrial motors can deliver very substantial energy reductions leading to impressive cost savings.

Drier fans: a new industrial application for Variable-Frequency Drives

One plant MRO engineering and maintenance team recently benefited from a new VFD-driven application because they took the time to measure their typical energy consumption with, and without, an installed variable-frequency drive. The team's experience led to measurable energy cost savings of over 50% with the installed VFD when compared with the energy consumption of the same equipment operating without a VFD.

The Temple-Inland manufacturing facility located in McQueeney, Texas, outside San Antonio, is part of the $4 billion, 12,000 employee, Temple-Inland organization.

The McQueeney plant is one of 15 manufacturing facilities that make up the Temple-Inland Building Products group that accounts for approximately $800 million in annual sales. The McQueeney plant produces sheetrock, or gypsum wallboard, for use in the construction industry. During product manufacturing, large industrial fans are used to draw out the water in order to dry the sheetrock.

"Temple-Inland's sheet rock plant has been a reliable, low-volume customer for years, buying two or three drives each year," said Nick Kitto, LV Drives Specialist for Siemens Energy & Automation. "When I asked my Temple-Inland contact, Mickey Cummins, the plant electrical

foreman, what I could do to earn more business, Mickey responded with a typical answer, saying 'Give me the product at no charge, or give me the budget to do it.'"

That meeting led to a three-way conversation about energy efficiency and motors that included Temple-Inland's Mickey Cummins and David Figari, the industrial specialist for AWC, Inc., the distributor for Siemens Energy & Automation that services Temple-Inland.

"When you start an industrial electric motor it takes a significant amount of energy to overcome friction and inertia," explained Figari. "If you're starting up a motor to reach its rated horse power load, a motor typically uses 600 to 650 percent of its current load rating. But when a variable-frequency drive controls the motor, far less energy is needed to start that motor."

Figari said the high cost associated with industrial motor operation means that a 50-horsepower motor rated at 90% efficiency and running 24/7, would consume more than $25,000 in electrical costs -- every year.

"The amount of energy savings that can be realized from more efficiently operating motors, pumps and fans such as those in the Temple-Inland plant can be very substantial, especially with large motors" said Figari. "Industrial energy consumption begins with motors, but fans are second in using the greatest amounts of industrial energy."

"This particular Temple-Inland plant has ten large drying fans that blow varying amounts of air during the process," said Kitto. "Historically, the fans were run continuously at full speed for the entire shift. The flow of air was controlled by choking off or opening up the air supply as required."

The McQueeney plant MRO team led by Maintenance Manager, John Gueldner, had relied on Siemens drives for numerous plant applications, but never for controlling the fan motors in the drying area.

"Plant maintenance budgets are typically too small for us to consider equipment upgrades," explained Gueldner. "We were happy with Siemens drives, but we would only replace a drive with Siemens equipment when the unit wore out."

"I usually look for a 2-year payback, and in this economy I'm looking for a 6-month payback," said Gueldner. "Initially, we projected a 6-month ROI for the new drive/fan application. And it's coming in at 5 ½ months. We've installed two new 200-horsepower drives with a third being installed soon, and we're looking for $10,000 per month in energy savings."

SinaSave Energy-saving software calculated the VFD payback period

The Siemens/AWC team was convinced that if they could measure the energy use at the Temple-Inland plant on motors that remained uncontrolled by VFDs, they would be able to demonstrate to the plant MRO team that the energy cost savings would generate a quick payback, and long-term savings on the plant's electrical bills, substantiating the investment for new drives.

Sparked by Figari and Kitto, AWC worked closely with Siemens to run a 'Technology Catch-Up' mini trade show for key customers that included short seminars, as well as hands-on product demos. Temple-Inland's engineering team, including Mickey Cummins, attended one such

technical presentation that helped clarify the energy reduction potential if VFDs were installed to make the fan motors operate variably rather than continuously.

“AWC’s free drives training seminar was key in helping us open the door to our buying and installing the Siemens Micromaster MM440 VFD for our fan application,” said Cummins.

Using Siemens’ SinaSave software, which is available free on the Siemens website, and actual Temple-Inland plant data on power consumption for one fan provided by Mickey Cummins, the Siemens, AWC and Temple-Inland team developed a model of the amount of electricity that could be saved by using a VFD to regulate the fan speed, rather than controlling the air supply while running the fans continuously at full speed.

“When Nick Kitto visited the plant he had the SinaSave™ energy-saving software program right on his laptop,” said Cummins. “When Nick entered our actual motor energy data from Temple-Inland, we were able to illustrate the energy cost savings by introducing variable speed to our fans. This was central to Temple-Inland discovering how fast our investment in additional frequency drives would amortize.”

“The SinaSave software is a good tool for plant engineers to test energy saving ideas, and how new drives and energy efficient motors can have a significant impact on electricity consumption,” said Figari.

“When we met with Mickey Cummins to discuss the ROI ramifications, his eyes went wide,” said Kitto. “We had used some actual numbers from his plant and he couldn’t believe it. Cummins said ‘I don’t believe these numbers. Let me get the plant engineer involved.”

“After consulting with Temple-Inland’s John Gueldner, they said ‘Yeah, it all looks good on paper, but how do we prove it?’” added Kitto.

“Temple-Inland agreed to test one fan,” said Kitto. “Using a power monitoring device and the necessary software, borrowed from the Siemens Power Monitoring Group, the MRO team captured the electricity demand for one of the fans, before and after installing a 200 horsepower drive.”

Temple-Inland’s actual on-site plant monitoring verified the current draw to be 175 Amps per fan. When the Siemens VFD was connected to the fan, the current pull dropped to 95 Amps – a reduction of 54%.

“Most important in helping us make a decision to add VFDs to our fan operations was the amount of quality data measurements we were able to collect by hooking up one drive to run a fan,” said Cummins. “It was also important that Siemens offered us their Try-Before-You-Drive Program, despite the fact we were already convinced to purchase the drive.”

Big energy savings provided by the Siemens Micromaster MM440 VFD
Not surprisingly, the ROI calculation proved central to the Temple-Inland team making the purchase and installing the Siemens VFDs.

The energy-saving drive solution for Temple-Inland is the Siemens Micromaster MM440 VFD inverter, a vector drive designed to handle a variety of demanding variable-speed drive

applications. The drive is especially suitable for applications that require dynamic response, torque control, and tight speed regulation. The Micromaster MM440 VFD combines programming flexibility for various applications and ease of use.

Temple-Inland's team was adequately impressed with the data projecting very substantial energy cost savings from the fan application and decided to purchase the first Micromaster 440 VFD at the end of February, 2008, and installed the 200-horsepower drive in April.

"This drive is easy to put in, start up, and commission, and it's incredibly flexible to easily run many different applications," reported Cummins. "Besides our fans, we currently also use this drive to run basic conveyors, rotary air locks, basic screw locks, and entry-level motion control."

"We have now ordered five new MM440 drives for the fan application," said Temple-Inland's Gueldner. "Soon, two of them will be installed giving us a total of 45 Siemens drives plant wide."

"If you can use a drive to reduce the load by reducing the fan speed to 70%, you can save 50% on your energy costs," said Kitto. "It was as if Temple-Inland was running a car at full speed with their foot on the brake. Now, with the Micromaster 440 VFD installed to control the fans, they're taking their foot off the gas, and the drives are now saving the company a considerable amount on their electrical costs."